F384/F640

Uncooled Thermal Imaging Module

Product Manual

V1.0.1

Version History

Version	Time	Description
V1.0.0	2024-07	Initial release
V1.0.1	2024-09	Add the option of 17 network board; modify the aperture of two zoom lenses; adjust the FOV of the zoom lenses.

Table of Contents

1 Overview

The F384/F640 uncooled thermal imaging cores feature a built-in self-developed high-sensitivity VOx infrared detector, offering consistently high-performance core components, advanced image algorithms, and lens control technology. These innovations bring a whole new level of experience to long-range monitoring. The product can be widely applied in various scenarios, including perimeter security, high-altitude observation, forest fire prevention, water monitoring, and industrial temperature measurement.

To facilitate customer integration and development, the F384/F640 uncooled thermal imaging cores are available in observation and radiometric types.

The observation-type thermal imaging cores feature the latest generation image algorithm, optimized for specific scenarios such as forests, seascapes, skies, rain, and foggy weather, providing customers with clear and sharp infrared images.

The radiometric thermal imaging cores utilize the brand new temperature measurement algorithm, covering 384×288/640×512 infrared resolutions. They support high-precision temperature measurement with an extensive range of -20°C to +650°C with an accuracy of ±2°C. Additionally, they can output comprehensive temperature data for secondary temperature analysis. While delivering high-definition and high-quality infrared thermal images, these cameras meet the temperature measurement requirements in various integration scenarios, reducing development complexity.

The thermal imaging cores support athermalized fixed-focus lenses, fixed-focus motorized focus adjusting lenses, and continuous zoom lenses. They can achieve functions like motorized focus adjustment, continuous zoom, automatic focus, and defocusing compensation.

The F384/F640 uncooled thermal imaging cores provide video output interfaces options such as network interfaces, BT.601, BT.1120, with the possibility of expanding to SDI, USB, CameraLink, HDMI interfaces. Additionally, SDK is available, making it user-friendly, reducing development time, increasing efficiency, and lowering secondary development costs.

2 Lens Specification

Table 2.1 Athermal Lens Model

Array Format	E.F.L./F#	Lens Type	FOV (H*V)	IFOV
640×512	4.1mm F1.2	Athermal	100°×82°	2.927mrad
384×288			62.1°×47.2 °	
640×512	9.1mm F1.0	Athermal	48.6°×38.6°	1.319mrad
384×288			29.1°×21.7 °	
640×512	13mm F1.0	Athermal	32.9°×26.6°	0.923mrad
384×288			19.7°×14.9°	
640×512	25mm F1.0	Athermal	17.4°×14°	0.480mrad
384×288			10.4°×7.8°	
640×512	35mm F1.0	Athermal	12.5°×10°	0.343mrad
384×288			7.5°×5.7°	
640×512	55mm F1.0	Athermal	8.0°×6.4°	0.218mrad
384×288			4.8°×3.6°	

Table2.2 Motorized Lens Model

Array Format	E.F.L./F#	Lens Type	FOV (H*V)	IFOV
640×512	13mm F1.0	Motorized Focus	33.7°×27.0°	0.923mrad
384×288			20.2°×15.2°	
640×512	25mm F1.0	Motorized Focus	17.6°×14.1°	0.480mrad
384×288			10.6°×7.9°	
640×512	50mm F1.0	Motorized Focus	8.8°×7.0°	0.240mrad
384×288			5.3°×3.9°	
640×512	75mm F1.0	Motorized Focus	5.9°×4.7°	0. 160mrad
384×288			3.5°×2.6°	
640×512	100mm F1.2	Motorized Focus	4.4°×3.3°	0.120mrad
384×288			2.6°×2.0°	
640×512	9mm~35mm F1.1~F1.1	Motorized Focus	12.5°×10°~52.2°×40.7°	0.343~1.333mrad
384×288			7.5°×5.65°~29.97°× 22.26°	

640×512	25mm~75mm F0.95~F1.2	Motorized Focus	17.7°×14.1°~5.8°×4.7°	0.160~0.480mrad
384×288			3.3°×2.6°~9.9°×7.9°	
640×512	20mm~100mm F0.8~F1.1	Motorized Focus	4.4°×3.5°~22.5°×17.8°	0.120~0.600mrad
384×288			2.6°×2.0°~13.5°×10.0°	
640×512	30mm~150mm F0.85~F1.2	Motorized Focus	2.9°×2.3°~14.7°×11.7°	0.080~0.400mrad
384×288			1.7°×1.3°~8.2°×6.6°	
640×512	25mm~225mm F0.95~F1.5	Motorized Focus	1.9°×1.6°~17.7°×14.1°	0.053~0.480mrad
384×288			1.1°×0.9°~9.9°×7.9°	
640×512	35mm~350mm F0.92~F1.5	Motorized Focus	12.6°×10.0°~1.3°×1.0°	0.034~0.343mrad
384×288			0.7°×0.6°~7.1°×5.7°	

3 Product Performance Parameters

3.1 01 series

The performance parameters of **01 series** thermal imaging cores are shown in Table 3.1:

Table 3.1 Performance Parameters

Model	384	640	384 radiometric	640 radiometric
Performance Index				
Detector Type	VOx uncooled IRFPA			
Pixel Resolution	384*288	640*512	384*288	640*512
Pixel Pitch	12μm			
Frame Rate	50Hz			25Hz
Spectral Range	8～14μm			
NETD	≤40mK@25℃, F#1.0			
Image Adjustment				
Polarity	Black hot/White hot			
Color Palettes	Support (18 types)			
Digital Zoom	1.0~8.0× Continuous Zoom (in 0.1×increment), magnify in any area			
Image Processing	NUC			
	Brightness and contrast adjustment			
	Temporal Filter and Spatial Filter			
	Digital Detail Enhancement			
	Image style switching			

Model		384	640	384 radiometric	640 radiometric
Image Mirror		Left-right/Up-down/Diagonal			
Temperature Measurement and Alarm Function					
Temperature Measurement Range		Unavailable		-20℃~150℃, 0℃~650℃	
Temperature Measurement Accuracy		Unavailable		±2℃ or ±2%@ambient temperature -20℃~60℃	
Temperature Scale		Unavailable		Support	
Isotherm		Unavailable		Support	
Solar Protection		Support			
Fire Alarm		Support			
Lens Control					
Lens Type		Athermalized fixed focus/motorized fixed focus/Continuous zoom			
Auto Focus		Support (Auto focusing time near clear spot≤1.5s)			
Motorized Focus		yes			
Motorized Zoom		yes			
Power Supply					
Typical Supply Voltage		5-24V DC, the standard 12V DC is recommended			
Power Protection		Over-voltage/Under-voltage/Reverse Connection			
Typical Consumption @25℃		<1.8W	<1.8W	<2.0W	<2.0W
Interface					
Video Output	Analog Video	1 Channel PAL			
	Digital Video	LVCMOS/BT.601(1)/BT.1120(1)			
Video Sync Input		Support (2)			
Video Sync Output		Support (2)			
Serial Communication Interface		RS-232			
		RS-485(support PELCO-D protocol only)			
Physical Properties					
Weight		80±10g(Lens Excluded)			
Size		44.5mm × 43mm			
Environmental Adaptation					
Operating Temperature Range		-40℃～+70℃			
Storage Temperature Range		-45℃～+85℃			
Humidity		5-95%, no condensation			
Environment Certification					
RoHS 2.0		Compliant			

Note:

(1) The F384/F640 uncooled thermal imaging cores support the output of temperature data in addition to BT.1120 and BT.601 image data. The temperature data is separately output as CDS_2 and CDS_3 video.

(2) Only one kind can be chosen between Sync Input and Sync Output.

3.2 38 Series

The performance parameters of **38 series** thermal imaging cores are shown in Table 3.2:

Table 3.2 Product Performance Parameters

Model	384 Ethernet	640 Ethernet
Performance Indicators		
Detector Type	VOx uncooled IRFPA	
Pixel Resolution	384*288	640*512
Pixel Pitch	12μm	
Frame Rate	50Hz	
Spectral Range	8～14μm	
NETD	≤40mK@25℃, F#1.0	
Image Adjustment		
Polarity	Black hot/White hot	
Color Palettes	Support (18 types)	
Digital Zoom	1.0~8.0× Continuous Zoom (in 0.1×increment),magnify in any area	
Image Processing	NUC	
	Brightness and contrast adjustment	
	Temporal Filter	
	Spatial Filter	
	DDE	
Image Mirror	Left-right/Up-down/Diagonal	
Network Function		
Network Protocols	TCP/IP,UDP,ICMP,HTTP,HTTPS,FTP,DHCP,DNS,RTP,RTSP,RTCP,IGMP,SMTP, NTP, QoS	
Interoperability	ONVIF, GB28181, SDK	
Simultaneous Live View	Support at least 20 channels	
User Management	20 users at most, there levels:administrator, operator and user	
Browser	Support IE8 or higher, support multi-languages	
Smart Functions		

Model		384 Ethernet	640 Ethernet
Fire Detection		Support	
Smart Video Recording		Support	
Smart Alarm		Support linkage alarm of network disconnection, IP address conflict, memory full, memory error, illegal access and exception detection	
VCA		Cross line detection, intrusion detection	
Alarm Linkage		Video/snapshot/E-mail/ PTZ linkage /alarm output	
Lens Control			
Lens Type		Fixed focus/continuous zoom	
Auto Focus		Support (Auto focusing time near clear spot≤1.5s)	
Motorized Focus		yes	
Motorized Zoom		yes	
Power Supply			
Typical Supply Voltage		12V DC±10%	
Power Protection		Over-voltage/Under-voltage/Reverse Connection	
Typical Consumption @25℃		<2.0W	<2.0W
Interface			
Video Output	Analog Video	1 Channel PAL	
	Digital Video	LVCMOS/BT.601(1)/BT.1120(1)	
Video Sync Input		Support (2)	
Video Sync Output		Support (2)	
Serial Communication Interface		RS-232	
		RS-485(PTZ control)	
PELCO		Support standard PELCO-D, PELCO-P protocols	
Network Interface		Support ONVIF and GB28281	
Audio		Suport 1-channel input, 1-channel output	
Alarm		Support 1-channel DC 5V alarm level input, 1-channel switch alarm output	
Physical Properties			
Weight		155±10g(Lens Excluded)	
Size		47mm × 48mm × 50mm	
Environmental Adaptation			
Operating Temperature Range		-40℃～+70℃	
Storage Temperature Range		-45℃～+85℃	
Humidity		5-95%, no condensation	
Environment Certification			
RoHS 2.0		Compliant	

3.3 07 Series

The performance parameters of **07 series** thermal imaging cores are shown in Table 3.3:

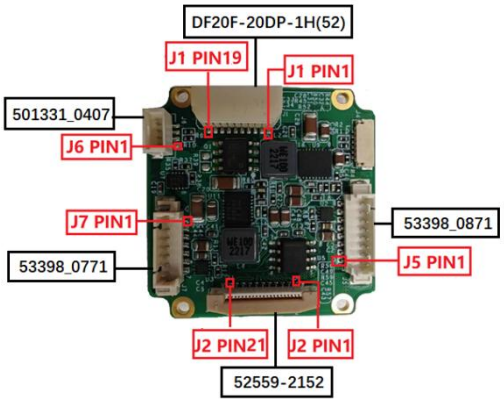
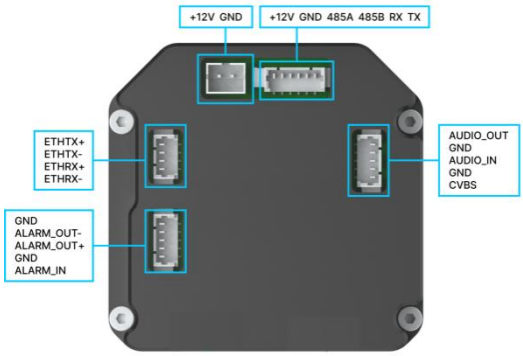
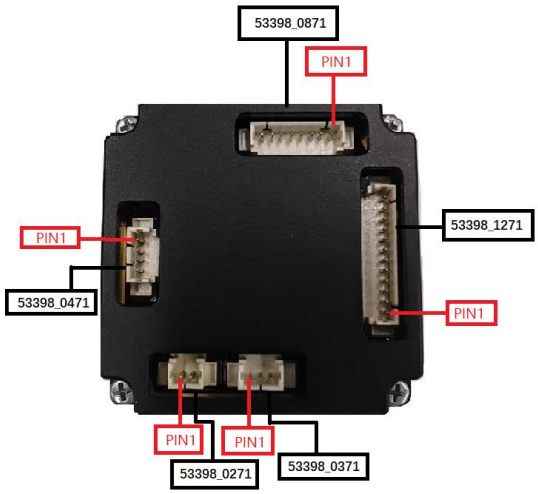
Table 3.3 Product Performance Parameters

Model	384 Ethernet	640 Ethernet
Performance Indicators		
Detector Type	VOx uncooled IRFPA	
Pixel Resolution	384*288	640*512
Pixel Pitch	12μm	
Frame Rate	50Hz	
Spectral Range	8~14μm	
NETD	≤40mK@25℃, F#1.0	
Image Adjustment		
Polarity	Black hot/White hot	
Color Palettes	Support (18 types)	
Digital Zoom	1.0~8.0× Continuous Zoom (in 0.1×increment),magnify in any area	
Image Processing	NUC	
	Brightness and contrast adjustment	
	Temporal Filter	
	Spatial Filter	
	DDE	
Image Mirror	Horizontal/Vertical/Horizontal&Vertical	
Network Function		
Network Protocols	TCP/IP,UDP,ICMP,HTTP,HTTPS,FTP,DHCP,DNS,RTP,RTSP,RTCP,IGMP,SMTP, NTP, QoS	
Interoperability	Modbus TCP, MQTT, ONVIF, GB28181, SDK	
Simultaneous Live View	Support up to 8 channels	
User Management	20 users at most, there levels:administrator, operator and user	
Browser	Supports Google, Firefox, Edge, and other browsers, and supports multiple languages.	
Smart Functions		
Fire Detection	Support	
Smart Video Recording	Support	
Smart Alarm	Support linkage alarm of network disconnection, IP address conflict, memory full, memory error, illegal access and exception detection	
VCA	Cross line detection, intrusion detection	

Model	384 Ethernet	640 Ethernet
Alarm Linkage	Video/snapshot/E-mail/ PTZ linkage /alarm output	
Lens Control		
Lens Type	Fixed focus/continuous zoom	
Auto Focus	Support (Auto focusing time near clear spot≤1s)	
Motorized Focus	yes	
Motorized Zoom	yes	
Power Supply		
Typical Supply Voltage	12V DC±10%	
Typical Consumption @25℃	<2.4W	<2.4W
Interface		
Serial Communication Interface	UART	
	RS-485(PTZ control)	
PELCO	Support standard PELCO-D, PELCO-P protocols	
Communication Interface	1 RJ45 10M/100M adaptive Ethernet port	
Network Interface	Support ONVIF and GB28281	
Audio	Suport 1-channel input, 1-channel output	
Alarm	Support 2-channel alarm input	
Storage Interface	Support Micro SD card (up to 256GB)	
Reset Button	Support hard reset	
Physical Properties		
Weight	96.5±10g(Lens Excluded)	
Size	45mm × 45mm	
Environmental Adaptation		
Operating Temperature Range	-40℃～+70℃	
Storage Temperature Range	-45℃～+85℃	
Humidity	5-95%, no condensation	
Environment Certification		
RoHS 2.0	Compliant	

4 User Expansion Board

Table 4.1 User Expansion Board List

Model	Picture(Illustration)	Main Interface	Compatible Modules
01Digital		● Power supply 5-24V ● RS-232, RS-485 (support PELCO protocol only) ● Analog Video ● LVCMOS, BT.601, BT.1120 digital video ● Lens Motor Interface ● Temperature sensor Interface ● Alarm in & Alarm out ● External sync signal	384/640
38 Ethernet		● Power supply 12V ● RS-485 (support PELCO protocol only) ● Analog Video ● Audio ● Ethernet port ● Temperature sensor Interface ● Alarm in & Alarm out	384/640
07 Ethernet		● Power supply 12V ● RS-485 (support PELCO protocol only) ● Analog Video ● Ethernet port ● Lens Motor Interface ● Audio in & out ● Alarm in & Alarm out	384/640

5 Structural Drawing

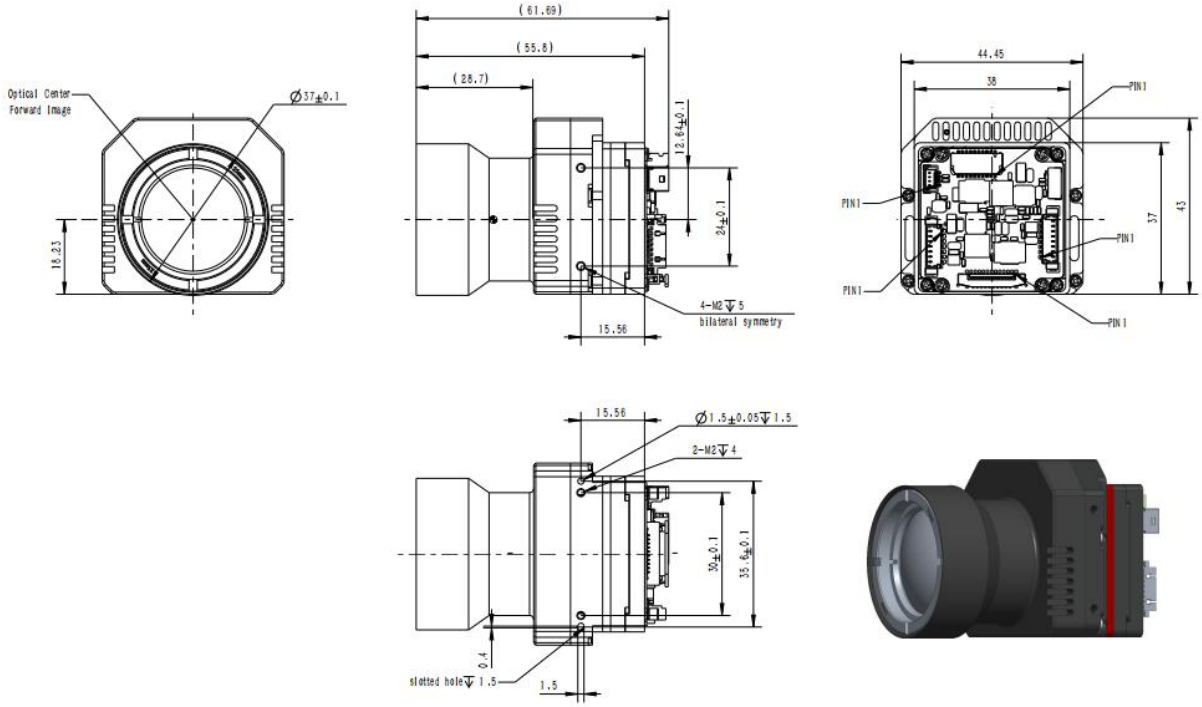


Figure 5.1 Dimension of 01 Series Cores with 25mm F1.0 Lens

Note:

The core dimensions vary when adapting different lenses and extension components; please refer to the core dimensions diagram for details.

6 Precautions

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. Do not make the thermal imaging modules directly towards the sun and other high-intensity radiation sources;
2. The optimal environment temperature for operating is - 20 ℃ to 50 ℃;
3. Do not touch or hit the detector window with hands or other objects;
4. Do not touch the equipment and cables with wet hands;
5. Do not bend or damage all cables;
6. Do not scrub your equipment with diluents;
7. Do not unplug and plug other cables without disconnecting the power supply;
8. Do not connect the wrong cable to avoid damage 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 our company, and professional personnel will carry out maintenance.