PRODUCT OVERVIEW

XFCAM640 Thermal Camera Series

640 x 512 VOx Uncooled Thermal Camera Modules - Four Factory Configurations

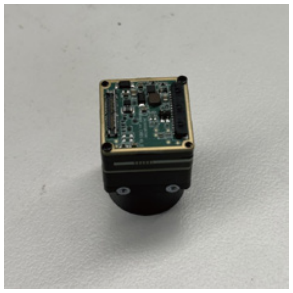
The XFCAM640 series packs a shutter-protected 640 x 512 uncooled VOx core into four compact camera configurations. Every variant combines detector, imaging electronics and an interchangeable lens in a 21 mm or 25 mm form factor from 21.4 g, streaming digital video over USB - with MIPI or Type-C on dedicated variants and analogue CVBS in parallel. Seven lenses from 4 mm to 55 mm tune the module from wide-area awareness to 6.1 km man-sized detection: FPV and UAS payloads, night navigation, search and rescue, security and industrial inspection.





XFCAM640-16P

21 mm - 16-Pin - MIPI / USB / CVBS





XFCAM640-TC

21 mm - Type-C - USB 2.0

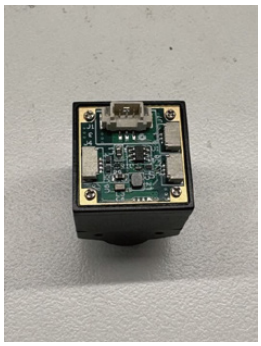




XFCAM640-25

25 mm - USB 2.0 - 12 µm core





XFCAM640-CV

21 mm - CVBS + USB - 12 µm core

640 x 512
VOX UNCOOLED RESOLUTION

40 mK max
NETD SENSITIVITY @ 25°C

7 LENSES
4 - 55 MM INTERCHANGEABLE

6.1 km
MAN-SIZED DETECTION (55 MM)

Key Features

Crisp 640 x 512 imaging - VOx uncooled detector, 40 mK max. NETD, under 12 ms time constant.

Seven lenses, 4 - 55 mm - down to 0.22 mrad IFOV and 6.1 km detection.

Light and rugged - from 21.4 g; 6.06 g rms vibration, 80 g shock rated.

Four factory configurations - one core, one lens mount, one integration workflow.

Shutter-based auto NUC - uniform imagery with White Hot / Black Hot polarity.

UART control - shutter and camera functions over serial on every variant.

Technical Specifications

PARAMETER	XFCAM640-16P	XFCAM640-TC	XFCAM640-25	XFCAM640-CV
DETECTOR & IMAGE				
IR Detector	VOx Uncooled IRFPA			
Resolution	640 x 512			
Frame Rate	30 / 60 Hz		50 Hz	
Pixel Pitch	8 µm		12 µm	
Spectral Range	8 - 14 µm			
NETD	40 mK max. (25°C, F/1.0, 25 Hz)			
Thermal Time Constant	< 12 ms			
Non-Uniformity Correction	Shutter Correction			
Polarity / Pseudo Color	White Hot / Black Hot			
VIDEO OUTPUT				
Digital Video	MIPI / USB	Type-C / USB	USB	
Analog Video	CVBS			
ELECTRICAL				
Power Input	5 V		5 - 12 VDC	
Power Consumption	1.3 W (5 V / 260 mA)		1.5 W max.	
PHYSICAL				
Weight (9.1 mm lens incl.)	22 g	30 g	31 g	21.4 g
Dimensions (9.1 mm lens incl.)	21 x 21 x 31.5 mm	21 x 21 x 41.7 mm	25 x 25 x 30 mm	21 x 21 x 30 mm
Lens Options	4 / 9.1 / 13.5 / 18 / 25 / 35 / 55 mm			
ENVIRONMENTAL				
Operating Temperature	-20°C to +50°C			
Storage Temperature	-30°C to +70°C			
Humidity	5% to 95%, non-condensing			
Vibration	6.06 g rms, random, all axes			
Shock	80 g peak, 4 ms sawtooth, 3 axes / 6 directions			

Notes: values measured at 25°C unless otherwise noted. Weight and dimensions include the 9.1 mm lens. Lens options are specified on page 3; mechanical outlines per variant on page 4.

Lens Options

All XFCAM640 variants share one lens mount. Seven factory lenses from 4 mm to 55 mm set the field of view and engagement range; every lens is F/1.0 and ships with its flange.

Lens	256 format	384 format	640 x 512 format
4.0 mm	43.3° x 32.8°	59.6° x 44.3°	-
9.1 mm	19.4° x 14.6°	29.2° x 21.7°	48.7° x 38.6°
13.5 mm	-	-	31.9° x 25.7°
18 mm	-	-	24.2° x 19.5°
25 mm	7.0° x 5.3°	10.5° x 7.9°	17.5° x 14.0°
35 mm	-	7.5° x 5.7°	12.5° x 10.0°
55 mm	-	-	8.0° x 6.4°

Table 1 - Field of view at F/1.0 by sensor format. The XFCAM640 uses the 640 x 512 column; 256/384 formats listed for reference.

Lens	IFOV (mrad)	Detection	Recognition	Identification	Weight
4.0 mm	3.07	0.43 km	0.1 km	0.054 km	10 g ± 2%
9.1 mm	1.3	1.1 km	0.25 km	0.19 km	10.5 g ± 5%
13.5 mm	0.9	1.5 km	0.37 km	0.18 km	15.2 g ± 5%
18 mm	0.7	2 km	0.5 km	0.25 km	25 g ± 5%
25 mm	0.48	2.8 km	0.7 km	0.35 km	67 g ± 2%
35 mm	0.34	3.9 km	0.97 km	0.49 km	111 g ± 2%
55 mm	0.22	6.1 km	1.5 km	0.76 km	191 g ± 2%

Table 2 - Range performance and lens weight (lens + flange). Ranges depend on scene conditions.

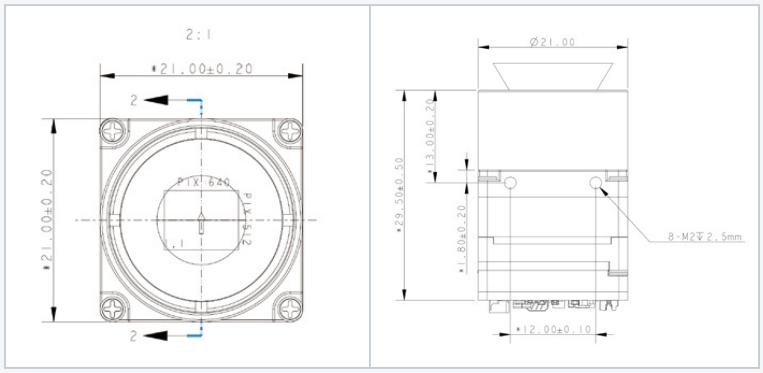
Choosing a Lens

- **4 - 9.1 mm** - wide situational awareness: FPV night flight, obstacle awareness and close-range search.
- **13.5 - 18 mm** - balanced general-purpose viewing in a compact form factor.
- **25 mm** - the surveillance sweet spot: 17.5° x 14° FOV with 2.8 km detection.
- **35 - 55 mm** - long-range watch: down to 0.22 mrad IFOV and 6.1 km detection for border and maritime work.

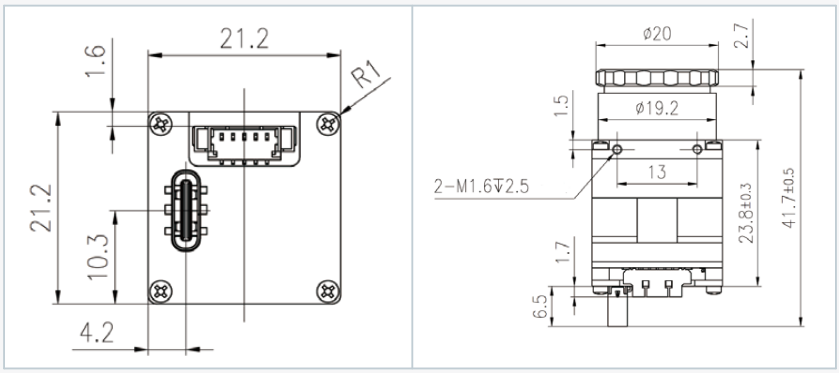
Mechanical Drawings

All dimensions in millimetres. Outlines shown with the 9.1 mm lens fitted.

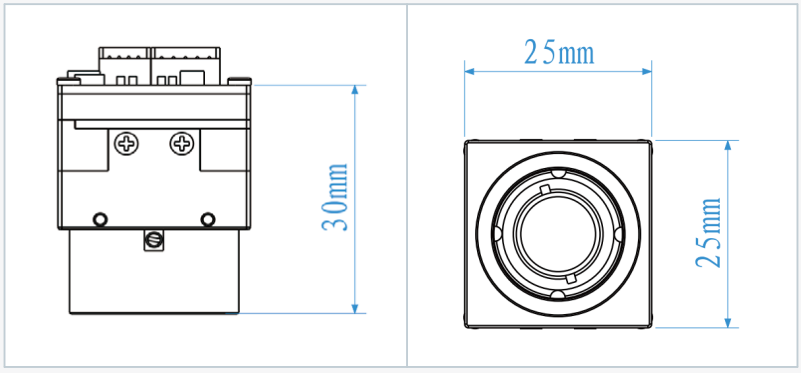
XFCAM640-16P - 21 x 21 x 31.5 mm - 22 g



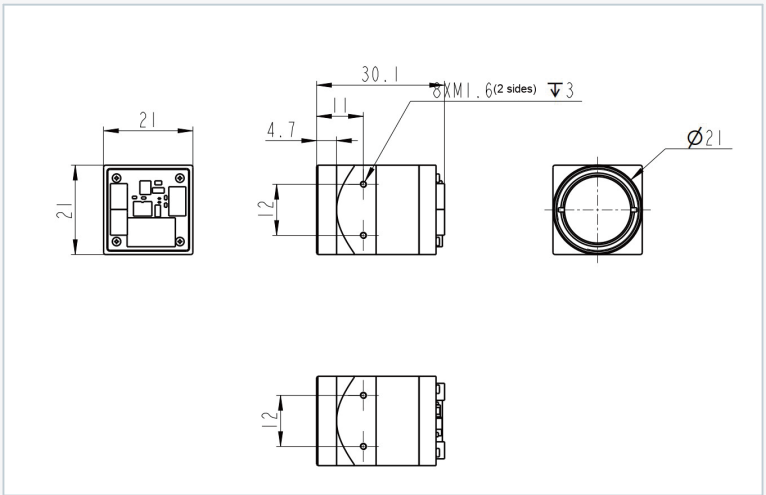
XFCAM640-TC - 21 x 21 x 41.7 mm - 30 g



XFCAM640-25 - 25 x 25 x 30 mm - 31 g

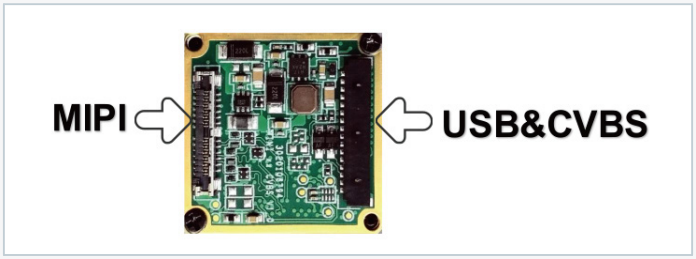


XFCAM640-CV - 21 x 21 x 30 mm - 21.4 g



Interface Definition - XFCAM640-16P

The 16-pin variant exposes MIPI and USB + CVBS on one board: module ports first, then the 16-pin interface pinout and the 26-pin MIPI expansion pinout.



Module ports - MIPI (left) and USB & CVBS (right).

No.	NAME	VOLTAGE	Fonction 1:J2		
			I/O Type	Group	Description
1	PAL	/	O	/	PAL output
2	AGND	/	G	/	AGND
3	RS232_RX	/	I/O	RS232	RS232_RX
4	RS232_TX	/	I/O	RS232	RS232_TX
5	DGND	/	G	DGND	DGND
6	USB_2.0_DP	/	I/O	USB2.0	Data signal positive terminal of USB2.0 port
7	USB_2.0_DM	/	I/O	USB2.0	Data signal negative terminal of USB2.0 port
8	DGND	/	G	DGND	DGND
9	KEY1	3.3V	I/O	GPIO	KEY1
10	KEY2	3.3V	I/O	GPIO	KEY2
11	KEY3	3.3V	I/O	GPIO	KEY3
12	KEY4	3.3V	I/O	GPIO	KEY4
13	KEY5	3.3V	I/O	GPIO	KEY5
14	DGND	/	G	DGND	DGND
15	DGND	/	G	DGND	DGND
16	POWER_IN1	5V	P_IN	POWER	Digital Power Supply

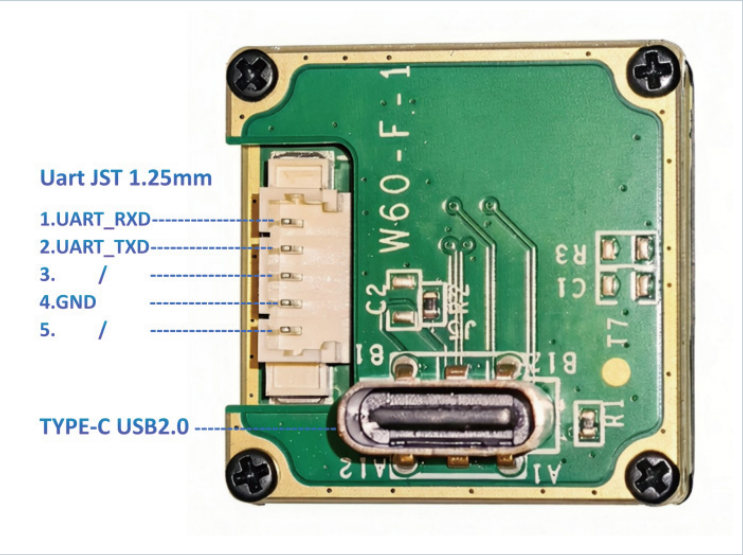
16-pin interface pinout.

No.	NAME	VOLTAGE	Fonction 1:J3		
			I/O Type	Group	Description
1	DV4	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:DATA4
2	DV_HSYNC	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:HSYNC
3	DV5	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:DATA5
4	DV_VSYNC	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:VSYNC
5	DGND	/	G	DGND	DGND
6	DGND	/	G	DGND	DGND
7	DV1	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:DATA1
8	DV6	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:DATA6
9	DV0	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:DATA0
10	DV7	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:DATA7
11	DGND	/	G	DGND	DGND
12	POWER_IN2	5V	P_IN	POWER	Digital Power Supply
13	DV3	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:DATA3
14	DV2	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:DATA2
15	MIPI_D1_-	/	O	MIPI	Video Output MIPI Signal:MIPI_D1_N
16	DV_CLK	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:CLK
17	MIPI_D1_+	/	O	MIPI	Video Output MIPI Signal:MIPI_D1_P
18	DV_FSYNC	3.3V/1.8V	I_PD/O	DVP	Video Output DVP Signal:FSYNC
19	UART0_656_TX	3.3V	O	UART	UART0_TX
20	UART0_656_RX	3.3V	I_PU	UART	UART0_RX
21	MIPI_D0_+	/	O	MIPI	Video Output MIPI Signal:MIPI_D0_P
22	MIPI_D0_-	/	O	MIPI	Video Output MIPI Signal:MIPI_D0_N
23	MIPI_CK_+	/	O	MIPI	Video Output MIPI Signal:MIPI_CK_P
24	MIPI_CK_-	/	O	MIPI	Video Output MIPI Signal:MIPI_CK_N
25	POWER_IN2	5V	P_IN	POWER	Digital Power Supply
26	POWER_IN2	5V	P_IN	POWER	Digital Power Supply

26-pin MIPI interface pinout.

Interface Definition - XFCAM640-TC

The Type-C variant carries a USB 2.0 Type-C socket and a 1.25 mm 5-pin UART connector on the bottom face; TX/RX wiring is crossed in the connection guide.



Bottom face - UART (JST 1.25 mm, 5-pin) and Type-C USB 2.0.

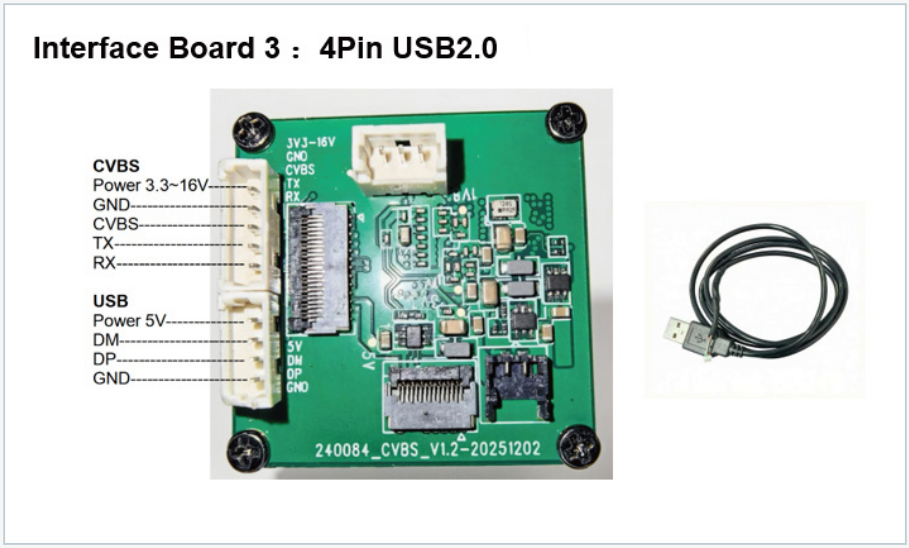
Physical Connection Guide

Host Controller Pin	Connection	Camera Module Pin
TX (Transmit)	→	RX (Receive)
RX (Receive)	→	TX (Transmit)
GND (Ground)	→	GND (Ground)

Physical connection guide - UART wiring.

Interface Definition - XFCAM640-25

The 25 mm variant breaks out CVBS, UART and USB through its interface board: CVBS power accepts 3.3 - 16 V, USB power 5 V. The 4-pin USB interface definition is shown with its wire colours.



Interface board - CVBS and USB connectors.

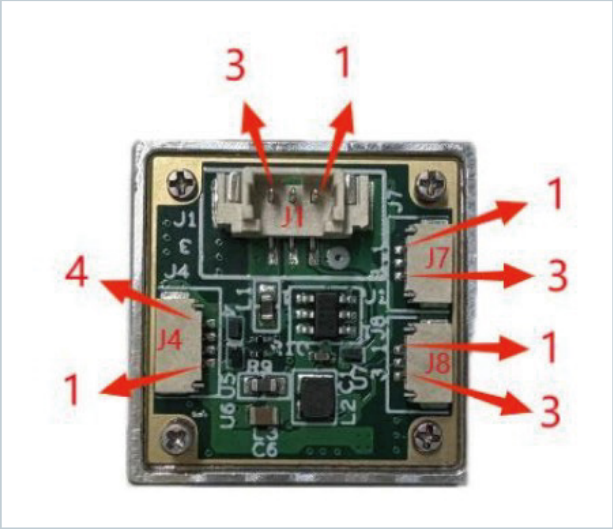
Interface Definition

Pin No.	Signal Name	Function Description	Typical Wire Color
1	POWER (VBUS)	Positive power supply (+5V DC)	Red
2	DM (Data Minus)	USB data negative line (differential pair)	White
3	DP (Data Plus)	USB data positive line (differential pair)	Green
4	GND	Power ground / signal ground	Black

4-pin USB interface definition (wire colours shown).

Interface Definition - XFCAM640-CV

The CVBS + USB variant exposes USB (J4), analogue CVBS (J3) and two UART connectors (J7 / J8) on the main board.



Main board connectors - J1 / J3 / J4 / J7 / J8.

J4: 4-pin USB connector

1	+5V	
2	USBDM	
3	USBDP	
4	GND	

USB Video Output Format:

1.UVC

J3: 3-Pin CVBS Interface

1	CVBS	
2	GND	
3	5-16V	

J4 USB (4-pin) and J3 CVBS (3-pin) definitions.

J7: 3PIN

1	UART1_TX
2	UART1_RX
3	GND

J8: 3PIN

1	UART0_TX
2	UART0_RX
3	GND

J7 / J8 UART (3-pin) definitions.

Serial Control

The camera shutter and other camera functions can be controlled over the serial (UART) interface on every XFCAM640 variant.

Note: ensure both devices share a common ground. The camera must be powered independently via its designated power input pins.

Ordering Information

Model	Configuration	Default Lens	Outputs
XFCAM640-16P	21 mm core, 16-pin board	9.1 mm	MIPI / USB + CVBS
XFCAM640-TC	21 mm core, Type-C board	9.1 mm	USB 2.0 + CVBS
XFCAM640-25	25 mm core, USB board	9.1 mm	USB 2.0 + CVBS
XFCAM640-CV	21 mm core, CVBS + USB board	9.1 mm	CVBS + USB

Optional lenses: 4 / 13.5 / 18 / 25 / 35 / 55 mm. Contact our sales team for custom lens, connector and firmware configurations.

Contact

WEBSITE	**www.xtraflysystems.com**
E-MAIL	**sales@xtraflysystems.com**
DOCUMENT	XFCAM640 Thermal Camera Series - Product Datasheet Rev 1.0