



# Tau 2

## Longwave Infrared Thermal Imaging Cameras

### Key Features:

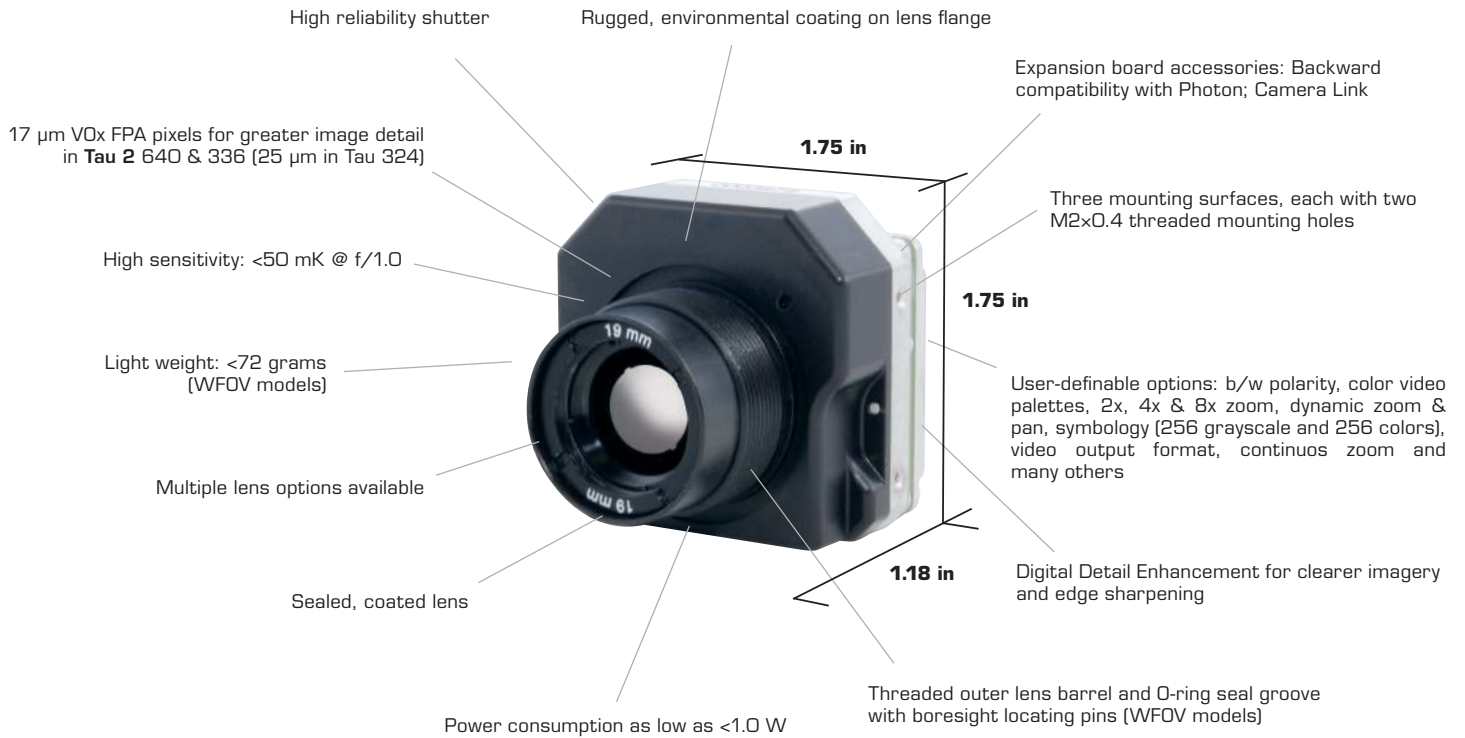
- Multiple models, including 640, 336 & 324
- Multiple lens options available: 7.5 – 100 mm
- Proven rugged, reliable thermal imaging for UAVs, UGVs & handheld devices

# Versatile & Compatible

## Loaded with Features, Ready for More

FLIR® Tau® 2 thermal imaging cameras offer an unmatched set of features and capabilities, making them well-suited to many demanding applications.

Improved electronics enable FLIR to implement new capabilities, including continuous digital zoom and radiometry. Since the electrical functions are common between the **Tau 2** 640, 336 and 324, integrators have direct compatibility between the different camera formats, and Tau 2 camera versions share many of the same lens options.

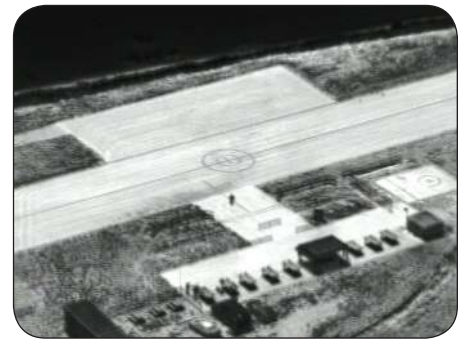


## FLIR Uncooled Cores Platforms and Applications

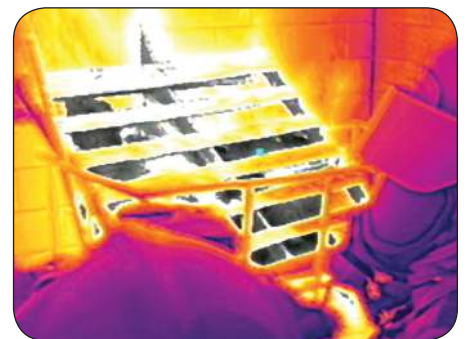
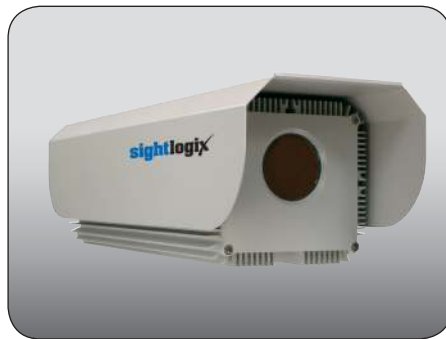
Tens of thousands of FLIR uncooled cores are fielded in:

- Unmanned vehicles
- Unattended ground systems
- Handheld imagers for firefighting
- Driving vision enhancement
- Thermal sights
- Security and surveillance

# Product Applications



Small, light, and reliable, Tau 2 is the perfect thermal camera core for small unmanned systems used for airborne imagery, security, perimeter protection and more.



Easy integration, low power consumption, and specialized imaging capabilities combine to make Tau 2 for (left to right) driving enhancement, security and firefighting systems.

# Tau 2

## Lens Data



7.5 mm



9 mm



13 mm

		TAU 2 WIDE FIELD OF VIEW (WFOV) MODELS <sup>1</sup>		
		f/1.25 (Tau 2 640 = f/1.4)	f/1.25 (Tau 2 640 = f/1.4)	f/1.25
<b>FOV<sup>3</sup></b> (h x v)	Tau 2 640 (17μ 640 × 512)	90° × 69°	69° × 56°	45° × 37°
	Tau 2 336 (17μ 336 × 256)	45° × 35°	35° × 27°	25° × 19°
	Tau 2 324 (25μ 324 × 256)	63° × 50°	49° × 39°	35° × 28°
<b>iFOV</b> (mrad <sup>4</sup> )	Tau 2 640 (17μ 640 × 512)	2.267	1.889	1.308
	Tau 2 336 (17μ 336 × 256)	2.267	1.889	1.308
	Tau 2 324 (25μ 324 × 256)	3.333	2.778	1.923
<b>Minimum Focus Distance<sup>4</sup></b>	All	2.5 cm	3 cm	8 cm
<b>Length<sup>5</sup></b>		19 mm	19 mm	19 mm
<b>Diameter</b>	All	29 mm	29 mm	29 mm
<b>Weight (Camera + Lens)</b>		<71 g	72 g	<70 g
<b>Detection, Recognition, Identification (DRI)<sup>6</sup></b>		D = 210/235	D = 250/285	D = 390/440
	<b>Typical/Best Conditions (range in meters)</b>			
	Tau 2 640 & 336 - Man	R = 52/60 I = 26/30	R = 63/71 I = 31 /36	R = 95/112 I = 47/56
	Tau 2 640 & 336 - Vehicle	D = 580/730 R = 150/180 I = 58/92	D = 720/880 R = 175/220 I = 88/108	D = 1,080/1340 R = 275/340 I = 140/170
	Tau 2 324 - Man	D = 170/185 R = 42/43 I = 21/23	D = 205/230 R = 52/57 I = 26/28	D = 300/330 R = 74/82 I = 37/41
	Tau 2 324 - Vehicle	D = 480/570 R = 120/140 I = 60/72	D = 590/700 R = 150/175 I = 74/88	D = 840/1000 R = 215/250 I = 108/125

- 1 – All WFOV lenses are integrated directly into a common lens holder with an internal O-ring that furnishes an IP-67 rating at the front surface. All WFOV lenses are M24 × 0.5 inside thread. Outside thread is M29 × 0.5.
- 2 – NFOV lenses are M34 × 0.3 inside thread.
- 3 – Digital output used for FOV calculation.
- 4 – Minimum focus distance for WFOV cameras is measured with the lens unscrewed to the point just before the O-ring groove becomes visible; for NFOV cameras it is measured one complete revolution after the lens first engages the lens flange.
- 5 – Length is measured from the front, flat surface of the lens holder to the end of the lens.
- 6 – DRI values shown are nominal values and should be used as estimates only. Exact DRI calculations depend on a wide variety of conditions. For more information, please contact FLIR.



19 mm



25 mm



35 mm



50 mm



60 mm



100 mm

TAU 2 NARROW FIELD OF VIEW (NFOV) MODELS<sup>2</sup>

19 mm		25 mm		35 mm		50 mm		60 mm		100 mm	
f/1.25		f/1.1		f/1.2		f/1.2		f/1.25		f/1.6	
32° x 26° 17° x 13° 24° x 19°		25° x 20° 13° x 10° 18° x 15°		18° x 14° 9.3° x 7.1° 13° x 10°		12.4° x 9.9° 6.5° x 5.0° 9.3° x 7.3°		10.4° x 8.3° 5.5° x 4.2° 7.7° x 6.1°		6.2° x 5.0° 3.3° x 2.5° 4.6° x 3.7°	
0.895 0.895 1.316		0.680 0.680 1.000		0.486 0.486 0.714		0.340 0.340 0.500		0.283 0.283 0.417		0.170 0.170 0.250	
16 cm		30 cm		60 cm		1.5 m		2.3 m		7 m	
19 mm 29 mm <70 g		30 mm 42 mm 112 g		39 mm 42 mm 150 g		62 mm 58 mm 280 g		62 mm 61 mm 200 g		110 mm 82 mm 479 g	
D = 570/640 R = 144/160 I = 72/80		D = 820/930 R = 210/230 I = 104/116		D = 1140/1280 R = 280/320 I = 142/160		D = 1500/1700 R = 380/430 I = 190/215		D = 1750/2000 R = 450/510 I = 225/255		D = 2450/2950 R = 650/750 I = 330/380	
D = 1,550/1950 R = 400/500 I = 200/250		D = 2200/2800 R = 580/710 I = 290/360		D = 3000/3850 R = 800/950 I = 200/295		D = 3900/5100 R = 1060/1320 I = 540/660		D = 4500/6000 R = 1240/1560 I = 640/780		D = 6000/8800 R = 1750/2300 I = 900/1160	
D = 450/490 R = 112/124 I = 56/62		D = 590/650 R = 148/165 I = 75/85		D = 800/880 R = 200/225 I = 105/112		D = 1125/1280 R = 290/320 I = 145/160		D = 1320/1500 R = 340/380 I = 170/190		D = 2075/2400 R = 540/600 I = 270/300	
D = 1,280/1500 R = 330/375 I = 165/190		D = 1650/1950 R = 430/500 I = 215/250		D = 2250/2700 R = 590/680 I = 290/340		D = 3100/3800 R = 810/970 I = 415/490		D = 3600/4600 R = 960/1160 I = 480/580		D = 5300/7100 R = 1500/1840 I = 760/920	

### Tau 2 Part Number Configuration Guide (Ex: 46640019H-FP NLX)

**46 640 019 H - F P NL X**

SHUTTER TYPE	RESOLUTION	LENS FOCAL LENGTH	LENS COATING	VIDEO SPEED	TAU TYPE	OEM INFO LOGO	EXPANSION CARD
46 = Standard 47 = Shutterless	640 (640 x 512) 336 (336 x 256) 324 (324 x 256)	001 = no lens 007 = 7.5 mm 009 = 9 mm 013 = 13 mm 019 = 19 mm 025 = 25 mm 035 = 35 mm 050 = 50 mm 060 = 60 mm 100 = 100 mm	H = Hard Carbon X = No Lens	F = Fast (60 Hz, 50 Hz) S = Slow (7.5 Hz, 8.3 Hz)	P = Performance	NL = No Logo <i>Also used for OEM ID</i>	X = No Card

# Accessories

There are several Tau-specific accessories available. Individual components are also available; contact FLIR for details.



VPC Breakout Module



Tau 2 with VPC Module Installed

## VPC Breakout Module

Provides video, power, and communications interface.

(FLIR p/n: 421-0039-00)



Tripod Adapter



Tau 2 Inverted with Tripod Adapter Installed

## TRIPOD ADAPTER

Allows users to put Tau 2 on a standard tripod mount.

(FLIR p/n: 261-2071-00)



Photon Replicator Kit



Tau 2 with PRK installed

## PHOTON REPLICATOR KIT

Gives users backward compatibility, including the ability to translate the 30-pin SAMTEC connector to a 15-pin D-sub connector.

(FLIR p/n: 421-0045-00)

Note: On the Tau 640 and Tau 2 640 cameras, the 15-pin cannot pass 14-bit digital data.



Photon Replicator Board



Tau 2 with PRB installed

## PHOTON REPLICATOR BOARD

Part of the Photon Replicator Kit, this board gives users who do not require a 015-pin D-sub connector backward compatibility.

(FLIR p/n: 421-0040-00)



Camera link board



Tau 2 with Camera Link Board installed

## CAMERA LINK EXPANSION BOARD

Furnishes 14-bit digital data with separate connectors for analog video, power and communication.<sup>†</sup>

(FLIR p/n: 421-0046-00)

† The Camera Link XP accessory provides access to Tau digital data. Portions of the base Camera Link specifications are not met: Camera control and power are not supported via the Camera Link connector. See Applications Notes for specifics. External frame sync is supported; contact FLIR for OEM details.



## TAU LENS FOCUS TOOL

Lets users adjust the focus of 9 mm, 13 mm, and 19 mm lenses.

(FLIR p/n: 421-0037-00)



## TAU LENS LOCKING RING

Lets users mount WFOV Tau cameras to a bulkhead.

(FLIR p/n: 421-0041-00)



## NARROW FIELD OF VIEW LENS HOLDER AND CLAMP

(FLIR p/n: 261-1485-00)



## 4" BLACKBODY SOURCE FOR LENS CALIBRATION & SUPPLEMENTAL FFC

(FLIR p/n: 285-0029-02)

# Specifications

## SYSTEM OVERVIEW

<b>System Type</b>	Uncooled LWIR Thermal Imager
<b>Tau 2 640</b>	640 x 512 VOx Microbolometer
<b>Tau 2 336</b>	336 x 256 VOx Microbolometer
<b>Tau 2 324</b>	324 x 256 VOx Microbolometer
<b>Pixel Size</b>	17 µm ( <b>Tau 2 640, 336</b> ); 25 µm ( <b>Tau 2 324</b> )
<b>Spectral Band</b>	7.5 - 13.5 µm
<b>Performance</b>	<50 mK @ f/1.0

## OUTPUTS

<b>Analog Video</b>	Field-switchable between NTSC and PAL
<b>Tau 2 640</b>	30 Hz (NTSC); 25 Hz (PAL); <9Hz option for export (factory set)
<b>Tau 2 336, 324</b>	30/60 Hz (NTSC); 25/50 Hz (PAL) ; <9Hz option for export (factory set)
<b>Digital Video</b>	8- or 14-bit serial LVDS; 8- or 14-bit customer selectable parallel CMOS; 8-bit BT.656

## OPERATION & CONTROL

<b>Image Control</b>	Invert, revert, continuous digital zoom, dynamic zoom & pan, 2x & 4x digital zoom (8x in <b>Tau 2 640</b> ), polarity, false color or monochrome, isotherms, AGC, digital detail enhancement (DDE), image optimization (BPR, NUC & AGC'd video), settable splash screens
<b>Camera Control</b>	Serial commands, SDK & GUI, dynamic range switching
<b>Signal Interface</b>	Camera Link (Expansion Bus Accessory Module), discrete I/O controls available, RS-232 compatible (57,600 & 921,600 baud), external sync input/output, power reduction switch (removes analog video)
<b>FFC Duration</b>	<0.5 sec

## RADIOMETRIC FEATURES

<b>Isotherms</b>	See Product Spec
<b>Spot Meter</b>	Temperatures measured in central 4x4
<b>Advanced Radiometry</b>	Improved accuracy, moveable spot meter, re-sizable spot meter, T-Linear (digital output), linear in scene temperature (OEM part number required, additional charge)

## PHYSICAL ATTRIBUTES

<b>Size</b>	1.75" x 1.75" x 1.18"
<b>Mounting Interface</b>	6 attach points in lens mount, M2 x 0.4 on 3 sides, 2 per side (sealable bulkhead mounting feature on lens barrel [M29 x 1.0], WFOV only)

## POWER

<b>Input Voltage</b>	4.0 – 6.0 VDC
<b>Primary Electrical Connector</b>	50-pin Hirose
<b>Power Dissipation</b>	~ 1.0 W ( <b>Tau 2 324 &amp; 336</b> ); <1.2 W ( <b>Tau 2 640</b> )
<b>Time to Image</b>	<5 seconds ( <b>Tau 2 640</b> ); <4 seconds ( <b>Tau 2 336 and 324</b> )

## ENVIRONMENTAL

<b>Operating Temperature Range</b>	-40° C to +80° C external temp
<b>Storage Temperature Range</b>	-55° C to +95° C external temp
<b>Scene Temp Range</b>	High gain: -40°C to +160°; Low gain: -40°C to +550°
<b>Shock</b>	200 g shock pulse with 11 msec sawtooth
<b>Temperature Shock</b>	5°/min
<b>Vibration</b>	4.3 g 3 axes, 8 hours each
<b>Humidity</b>	5 - 95% non-condensing
<b>Operational Altitude</b>	+40,000 feet
<b>ROHS, REACH, and WEEE</b>	Compliant

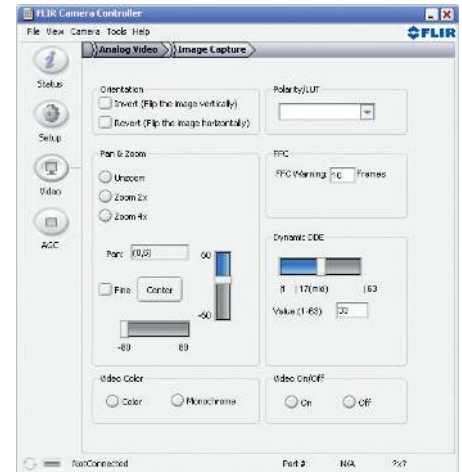
# Capabilities

## TAU 2

Tau 2 640, 336 & 324

Standard lens options	4 WFOV, 5 NFOV
WFOV lenses sealed to IP-67 at front surface	•
Threaded WFOV lens barrel for bulkhead mounting or external attachment options	•
Lens-less configuration offered	•
Ability to calibrate a second lens and store the calibration data in the camera via Advanced GUI function	•
Supplemental FFC feature allows users to calibrate out lens effects to improve image quality	•
Field-switchable between NTSC and PAL	•
Analog, BT .656, 8 bit & 14 bit LVDS or CMOS output	•
Camera Link digital data accessory option	•
Accessories available for backward-compatibility with Photon cameras	•
Expansion board reference design for customers to develop custom interface electronics	•
High-speed serial communications up to 921K autobaud	•
Camera Control GUI	•
Camera power and communication over USB	•
Up to 500g shock tolerance	•
Eight discrete camera input functions available to OEMs (14-bit CMOS interface limits users to one discrete function)	•
Shutterless version available for OEM customers with volume constraints	•
Field-upgradeable software/firmware	•
Support for user-defined symbology	•
Relative temperature measurement	•
Provision to load custom start-up splash screens (10-camera minimum purchase required)	•
Optional SDK for access to Tau's complete feature set	•

## TAU 2 GUI



Visit [www.flir.com/cvs/cores/knowledgebase](http://www.flir.com/cvs/cores/knowledgebase) to browse the Tau Knowledge Base.

Visit [www.flir.com/cvs/cores/tau640](http://www.flir.com/cvs/cores/tau640) to download the Tau GUI, connector pin-out definition, IDD interface, and User's Guide.



**SANTA BARBARA**  
 FLIR Systems, Inc.  
 70 Castilian Drive  
 Goleta, CA 93117  
 USA  
 PH: +1 805.690.5097  
 E-mail: [cbi@flir.com](mailto:cbi@flir.com)

**PORTLAND**  
 Corporate Headquarters  
 FLIR Systems, Inc.  
 27700 SW Parkway Avenue  
 Wilsonville, OR 97070  
 USA  
 PH: +1 877.773.3547  
 FX: +1 503.498.3153

**EUROPE**  
 FLIR Systems CVS BV  
 Charles Petitweg 21  
 4847 NW Teteringen - Breda  
 The Netherlands  
 PH: +31 (0) 765 79 41 94  
 FX: +31 (0) 765 79 41 99  
[www.flir.com](http://www.flir.com)

**FCC Notice.** This device is a subassembly designed for incorporation into other products in order to provide thermal imaging capability. It is not an end-product fit for consumer use. When incorporated into a host device, the end-product will generate, use, and radiate radio frequency energy that may cause radio interference. As such, the end-product incorporating this subassembly must be tested and approved under the rules of the Federal Communications Commission (FCC) before the end-product may be offered for sale or lease, advertised, imported, sold, or leased in the United States. The FCC regulations are designed to provide reasonable protection against interference to radio communications. See 47 C.F.R. §§ 2.803 and 15.1 et seq.

**Industry Canada Notice.** This device is a subassembly designed for incorporation into other products in order to provide thermal imaging capability. It is not an end-product fit for consumer use. When incorporated into a host device, the end-product will generate, use, and radiate radio frequency energy that may cause radio interference. As such, the end-product incorporating this subassembly must be tested for compliance with the Interference-Causing Equipment Standard, Digital Apparatus, ICES-003, of Industry Canada before the product incorporating this device may be: manufactured or offered for sale or lease, imported, distributed, sold, or leased in Canada.

**Avis d'Industrie Canada.** Cet appareil est un sous-ensemble conçu pour être intégré à d'autres produits afin de fournir une fonction d'imagerie thermique. Ce n'est pas un produit final destiné aux consommateurs. Une fois intégré à un dispositif hôte, le produit final va générer, utiliser et émettre de l'énergie radiofréquence qui pourrait provoquer de l'interférence radio. En tant que tel, le produit final intégrant ce sous-ensemble doit être testé pour en vérifier la conformité avec la Norme sur les appareils numériques causant des interférences (ICES-003) d'Industrie Canada avant que le produit intégrant ce dispositif puisse être fabriqué, mis en vente ou en location, importé, distribué, vendu ou loué au Canada.

**EU Notice.** This device is a subassembly or component intended only for product evaluation, development or incorporation into other products in order to provide thermal imaging capability. It is not a finished end-product fit for general consumer use. Persons handling this device must have appropriate electronics training and observe good engineering practice standards. As such, this product does not fall within the scope of the European Union (EU) directives regarding electromagnetic compatibility (EMC). Any end-product intended for general consumer use that incorporates this device must be tested in accordance and comply with all applicable EU EMC and other relevant directives.

Equipment described herein may require US government authorization for export purposes. Diversion contrary to US law is prohibited. Specifications are subject to change without notice. Imagery used for illustration purposes only.