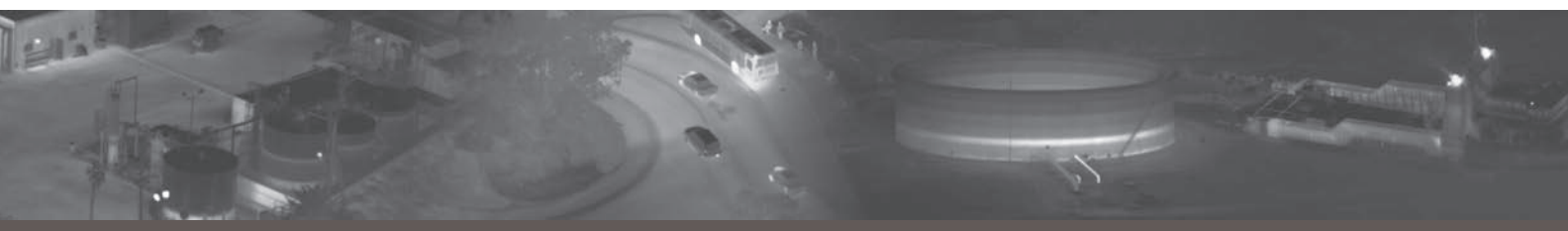


Tau 2 Product Line

Rugged, Reliable LWIR Thermal imagers

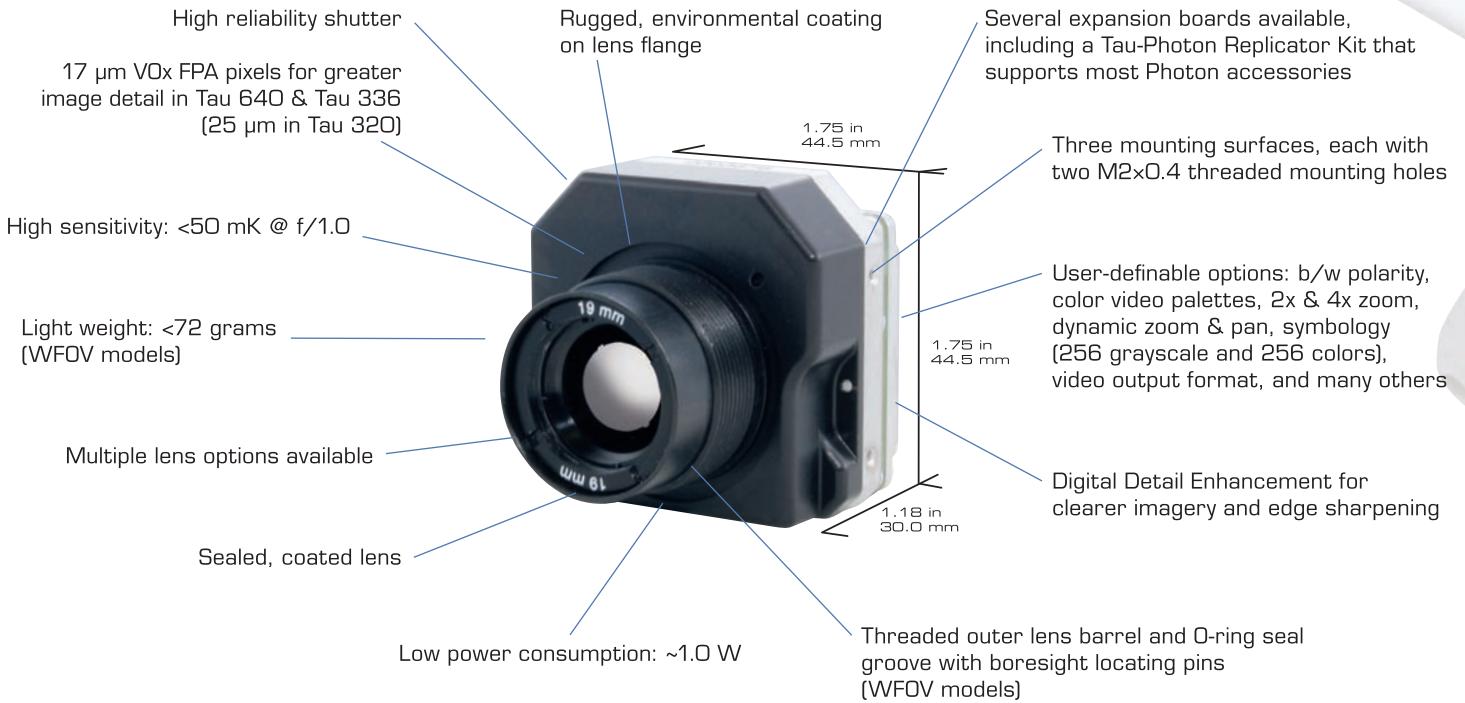


Tau 2: A major upgrade of the Tau uncooled thermal imaging camera models.

Introducing Tau 336 — a 17-micron pixel version of Tau 320.

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

Improved electronics will enable FLIR to implement new capabilities (continuous digital zoom, improved supplemental flat-field correction (FFC), radiometry, etc.) in the coming months. As more features are added, Tau 2 customers will be able to upgrade their cameras at no charge, without needing to return them to FLIR. Since the electronics are common among two Tau 640 models and the Tau 336 and 320, integrators have direct compatibility between the different camera formats, and Tau camera versions share all of the same lens options.

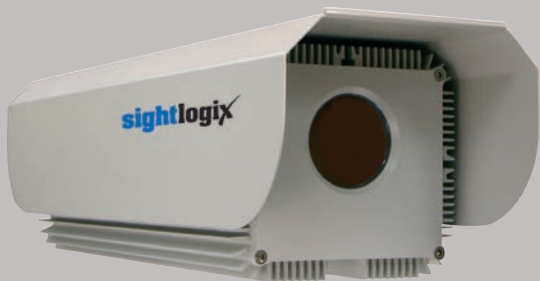


Tau 2 Part Number Configuration Guide (Example: 46640019H-FP-NL-X)

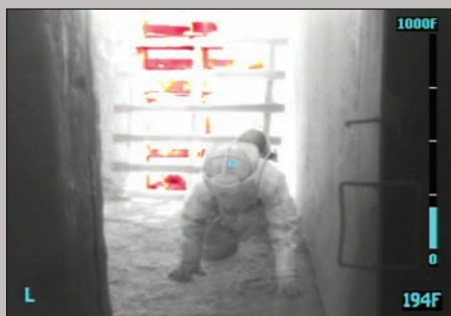
46 640 019 H-F P NL X

46	640	019	H	-	F	P	NL	X
Shutter Type	Resolution	Lens Focal Length	Lens Coating		Video Speed	Tau Type	OEM Info Logo/No Logo	Expansion Card
46 = Standard 47 = Shutterless	640 (640 × 512) 336 (336 × 256) 320 (324 × 256)	001 = no lens 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 = High Durability X = No Lens		F = Fast* S = Slow	P = Performance	NL = No Logo XX = FLIR Logo Also used for OEM ID	X = No Card P = Photon Replicator Board
					* Fast = 60 Hz, 50 Hz Slow = 7.5 Hz, 8.3 Hz			

Product Applications



Small, light, and reliable, Tau 2 is the perfect thermal camera core for small unmanned systems.



Easy integration, low power consumption, and specialized imaging capabilities combine to make Tau 2 an ideal firefighting thermal camera core.



Tau 2 Lens Data



9 mm



13 mm



19 mm

		Tau 2 Wide Field of View (WFOV) Models ¹			
		9 mm f/1.25 (Tau 640 = f/1.4)	13 mm f/1.25	19 mm f/1.25	
FOV³ (h x v)	Tau 640 (17 μ 640 x 512)	69° x 56°	45° x 37°	32° x 26°	
	Tau 336 (17 μ 336 x 256)	35° x 27°	25° x 19°	17° x 13°	
	Tau 320 (25 μ 320 x 256)	48° x 37°	34° x 26°	24° x 18°	
iFOV (mrads)	Tau 640 (17 μ 640 x 512)	1.889	1.308	0.895	
	Tau 336 (17 μ 336 x 256)	1.889	1.308	0.895	
	Tau 320 (25 μ 320 x 256)	2.778	1.923	1.316	
Minimum Focus Distance⁴	All Taus	3 cm	8 cm	16 cm	
Length⁵ Diameter Weight (Camera + Lens)	All Taus	19 mm	19 mm	19 mm	
		29 mm	29 mm	29 mm	
		72 g	< 70 g	< 70 g	
Typical/Best Conditions (range in meters) Detection, Recognition, Identification (DRI)⁶	Tau 640 & Tau 336 - Man	D	250/285 m	390/440 m	570/640 m
		R	63/71 m	95/112 m	144/160 m
		I	31/36 m	47/56 m	72/80 m
	Tau 640 & Tau 336 - Vehicle	D	720/880 m	1080/1340 m	1550/1950 m
		R	175/220 m	275/340 m	400/500 m
		I	88/108 m	140/170 m	200/250 m
	Tau 320 - Man	D	205/230 m	300/330 m	450/490 m
		R	52/57 m	74/82 m	112/124 m
		I	26/28 m	37/41 m	56/62 m
	Tau 320 - Vehicle	D	590/700 m	840/1000 m	1280/1500 m
		R	150/175 m	215/250 m	330/375 m
		I	74/88 m	108/125 m	165/190 m

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 x 0.5 inside thread. Outside thread is M29 x 0.5.

2 – NFOV lenses are M34 x 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.



Tau 2 Narrow Field of View (NFOV) Models²

25 mm f/1.1	35 mm f/1.2	50 mm f/1.2	60 mm f/1.25	100 mm f/1.6
25° x 20° 13° x 10° 18° x 14°	18° x 14° 9.3° x 7.1° 13° x 10°	12.4° x 9.9° 6.5° x 5.0° 9.1° x 6.9°	10.4° x 8.3° 5.5° x 4.2° 7.6° x 5.7°	6.2° x 5.0° 3.3° x 2.5° 4.6° x 3.4°
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
30 cm	60 cm	1.5 m	2.3 m	7 m
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
820/930 m	1140/1280 m	1500/1700 m	1750/2000 m	2450/2950 m
210/230 m	280/320 m	380/430 m	450/510 m	650/750 m
104/116 m	142/160 m	190/215 m	225/255 m	330/380 m
2200/2800 m	3000/3850 m	3900/5100 m	4500/6000 m	6000/8800 m
580/710 m	800/950 m	1060/1320 m	1240/1560 m	1750/2300 m
290/360 m	200/295 m	540/660 m	640/780 m	900/1160 m
590/650 m	800/880 m	1125/1280 m	1320/1500 m	2075/2400 m
148/165 m	200/225 m	290/320 m	340/380 m	540/600 m
75/85 m	105/112 m	145/160 m	170/190 m	270/300 m
1650/1950 m	2250/2700 m	3100/3800 m	3600/4600 m	5300/7100 m
430/500 m	590/680 m	810/970 m	960/1160 m	1500/1840 m
215/250 m	290/340 m	415/490 m	480/580 m	760/920 m

FLIR Uncooled Cores Platforms and Applications

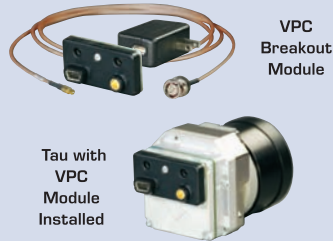
Tens of thousands of FLIR uncooled cores are being used as thermal imaging payloads or modules in:

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

Accessories

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

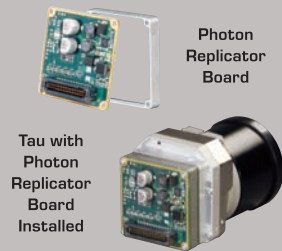
- VPC Breakout Module – Provides video, power, and communications interface. (FLIR p/n: 421-0039-00)



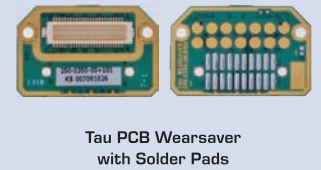
- Tripod Adapter – Allows users to put Tau 2 on a standard tripod mount. (FLIR p/n: 261-2071-00)



- Photon Replicator Board – (FLIR p/n: 421-0040-00) Gives users backward compatibility with the Photon Accessory Kit (FLIR p/n: 421-0045-00).



- Tau PCB Wearsaver with Solder Pads – A low-profile adapter that attaches to the Tau's 50-pin Hirose connector, furnishing a solder pad interface. Schematic included. (FLIR p/n: 421-0047-00)



- The Tau Lens Focus Tool – Lets users adjust the focus of 9 mm, 13 mm, and 19 mm lenses. (FLIR p/n: 421-0037-00)



- The Tau Lens Locking Ring – Lets users mount WFOV Tau cameras to a bulkhead. (FLIR p/n: 421-0041-00)



- Camera Link Expansion Board – Furnishes 14-bit digital data with separate connectors for analog video, power and communication.† (FLIR p/n: 421-0046-00)



- 4" Blackbody Source for lens calibration & supplemental FFC. (FLIR p/n: 285-0029-02)



- Narrow field of view lens holder and clamp. (FLIR p/n: 261-1485-00)



- Tau Software Developer's Kit (SDK) – Enables custom camera control interface development. (FLIR p/n: 110-0133-16)
- XP Reference PCB Design Files available upon request (for OEM PCB design).

† 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. A modification to the Camera Link board can be made to enable camera control via Camera Link. The XP accessory furnishes a mini-USB port for easy access to power and communications.
- External frame sync is supported; contact FLIR for OEM details.

Tau 2 Specifications

	Tau 640	Tau 336	Tau 320
General Product Specifications			
Thermal Imager	Uncooled VOx Microbolometer	Uncooled VOx Microbolometer	Uncooled VOx Microbolometer
FPA Formats	640 x 512	336 x 256	324 x 256
Pixel Pitch	17 µm	17 µm	25 µm
Spectral Band	7.5 - 13.5 µm	7.5 - 13.5 µm	7.5 - 13.5 µm
Full Frame Rates (User Selectable)	30 Hz; 25 Hz	30 Hz; 25 Hz or 60 Hz; 50 Hz	30 Hz; 25 Hz or 60 Hz; 50 Hz
Exportable Frame Rates (no license required)	7.5 Hz; 8.3 Hz	7.5 Hz; 8.3 Hz	7.5 Hz; 8.3 Hz
Sensitivity (NEΔT) (w/FLIR's proprietary noise reduction)	<50 mK at f/1.0	<50 mK at f/1.0	<50 mK at f/1.0
Scene Range (High Gain)	-40°C to +160°C	-40°C to +160°C	-40°C to +160°C
Scene Range (Low Gain)	N/A	-40°C to +550°C	-40°C to +550°C
Time to Image	<3.5 sec	<3.5 sec	<3.5 sec
Factory Set, User-Selectable AGC'd Video	Y	Y	Y
Physical Attributes			
Size (w/o lens)	1.75" x 1.75" x 1.18"	1.75" x 1.75" x 1.18"	1.75" x 1.75" x 1.18"
Lensed & Lensless Configurations Available	Y	Y	Y
Precision Mounting Holes (M2x0.4) on 3 Sides (2 per side)	Y	Y	Y
Sealable Bulkhead Mounting Feature on Lens Barrel (M29x1.0), WFOV Only	Y	Y	Y
Image Processing Controls			
NTSC Display Format	640 x 480	640 x 480 (upsampled & interpolated)	640 x 480 (upsampled & interpolated)
PAL Display Format	640 x 512	640 x 512 (upsampled & interpolated)	640 x 512 (upsampled & interpolated)
NTSC/PAL (field switchable)	Y	Y	Y
Image Optimization (BPR, NUC, & AGC'd video)	Y	Y	Y
Digital Detail Enhancement	Y	Y	Y
Display Controls			
Invert/Revert (analog and 8-bit digital)	Y	Y	Y
Polarity Control (black hot/white hot)	Y	Y	Y
2x & 4x Digital Zoom	Y	Y	Y
8x Digital Zoom	Y	N	N
Continuous Digital Zoom	Y	Y	Y
Dynamic Zoom & Pan	Y	Y	Y
Symbology (256 gray & 256 color)	Y	Y	Y
Color & Monochrome Palettes (LUTs)	Y	Y	Y
Digital Video			
Legacy Photon LVDS (14-bit or 8-bit)	Y	Y	Y
CMOS (14-bit or 8-bit)	Y	Y	Y
BT.656 (8-bit)	Y	Y	Y
Slow Video (factory configured)	Y	Y	Y
Camera Link (Expansion Bus Accessory Module)	Y	Y	Y
Interfacing			
Primary Electrical Connector	50-pin Hirose	50-pin Hirose	50-pin Hirose
Input Power (max 2.5 amp during shutter)	4.0 - 6.0 VDC	4.0 - 6.0 VDC	4.0 - 6.0 VDC
Power Dissipation	~1.0 W Steady-State	<1.0 W Steady-State	<1.0 W Steady-State
FFC Duration	<0.5 sec	<0.5 sec	<0.5 sec
Power Reduction Switch (removes analog video)	Y	Y	Y
RS-232 Compatible Communication	57,600 & 921,600 baud	57,600 & 921,600 baud	57,600 & 921,600 baud
External Sync Input/Output	Y	Y	Y
Discrete I/O Controls Available	Y	Y	Y
Settable Splash Screens	Y	Y	Y
User Configurability via SDK & GUI	Y	Y	Y
Dynamic Range Switching	N	Y	Y
Environmental			
Operating Temperature Range	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C
Non-Operating Temperature Range	-55°C to +95°C	-55°C to +95°C	-55°C to +95°C
Temperature Shock (5°/min)	Y	Y	Y
Operational Altitude (up to 40,000')	Y	Y	Y
Humidity (non-condensing between 5% and 95%)	Y	Y	Y
Vibration (4.3g three axis, 8 hr each)	Y	Y	Y
Shock (200g shock pulse w/ 11 msec sawtooth)	Y	Y	Y
ROHS, REACH, and WEEE Compliant	Y	Y	Y

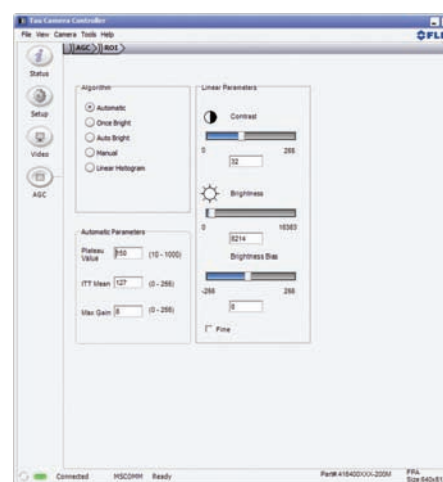
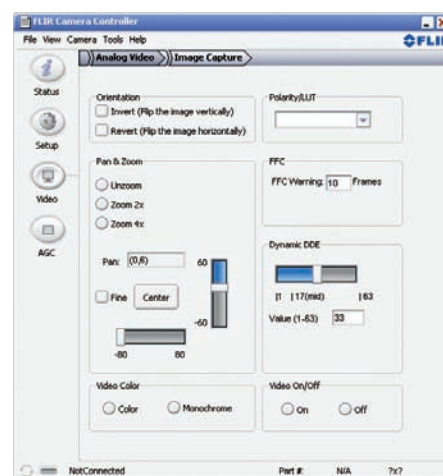
Tau 2 Capabilities

	Tau 640, Tau 336 & Tau 320
Standard lens options	3 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	✓
CMOS, BT.656, 14-bit LVDS data 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 baud	✓
Camera Control GUI	✓
Camera power and communication over USB	✓
Up to 200g shock tolerance	✓
Eight discrete camera input functions available to OEMs (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	Tau 320 & Tau 336
Provision to load custom start-up splash screens (10-camera minimum purchase required)	✓
Optional SDK for access to Tau's complete feature set	✓

Visit www.flir.com/cvs/cores/knowledgebase to browse the Tau Knowledge Base.

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

Tau 2 GUI



Other FLIR Camera Cores and Components:



Tau SWIR



Photon HRC



ROICs and Sensor Assemblies



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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.

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