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
- Mechanical/Electrical commonality for all resolutions

New Features

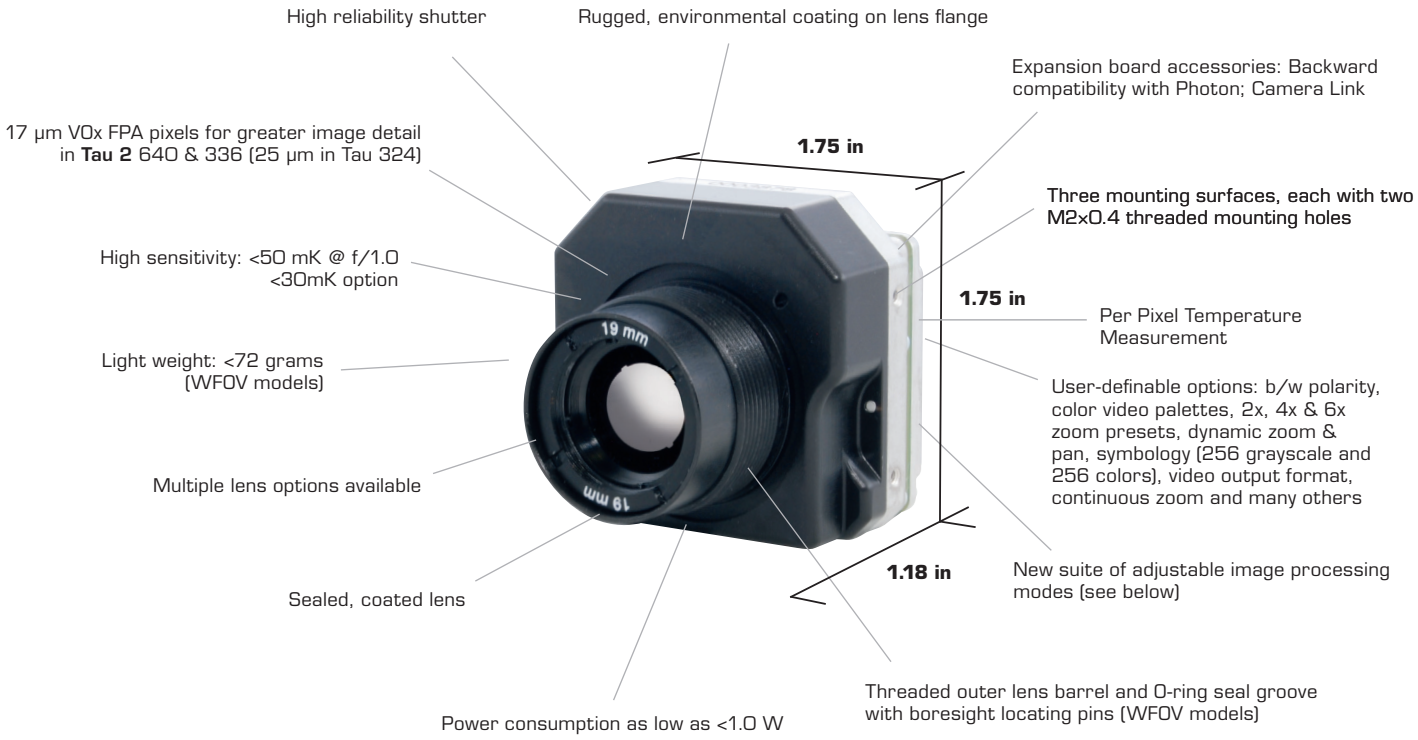
- 640x512 / 60 Hz frame rate
- Accurate temperature measurement for radiometry, analytics and telemetry
- New suite of adjustable image processing modes
- <30mK options

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.



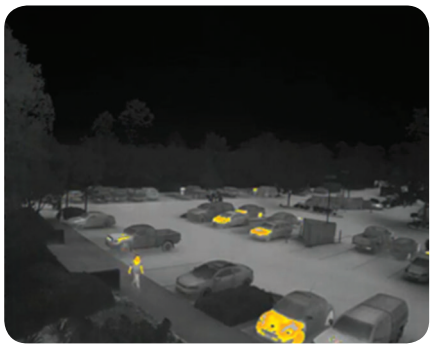
Unrivaled Image Processing and Temperature Measurement

- 60Hz Frame rate now available for all resolutions
- Adjustable image processing modes to increase contrast and detail
  - Second generation **DDE - Digital Detail Enhancement™** for clearer imagery and edge sharpening
  - **ACE - Active Contrast Enhancement™** to dynamically adjust scene contrast for relative scene temperature
  - **SSO - Smart Scene Optimization™** to enhance extremes in a bi-modal scene
  - **IBHEQ - Information Based HEQ™** automatically adjusts AGC for what matters most in a scene
  - **SSN - Silent Shutterless NUC™** for continuous image uniformity improvement
- FLIR's experience and reputation to provide accurate per pixel temperature data for:
  - Video Analytics & Telemetry
  - Radiometry
  - Adjustable isotherm thresholds to colorize temperatures of interest in the grayscale

Image Processing

Unrivaled Image Processing and Temperature Measurement

Isotherm

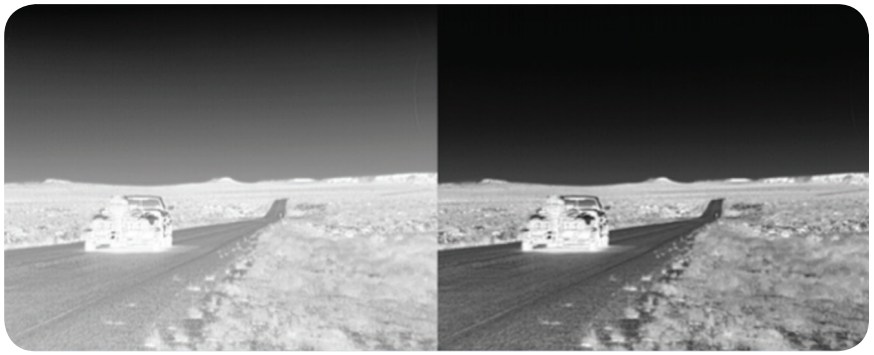


Manually set isotherm thresholds to colorize temperatures of interest (mid-range) in the grey scale

DDE

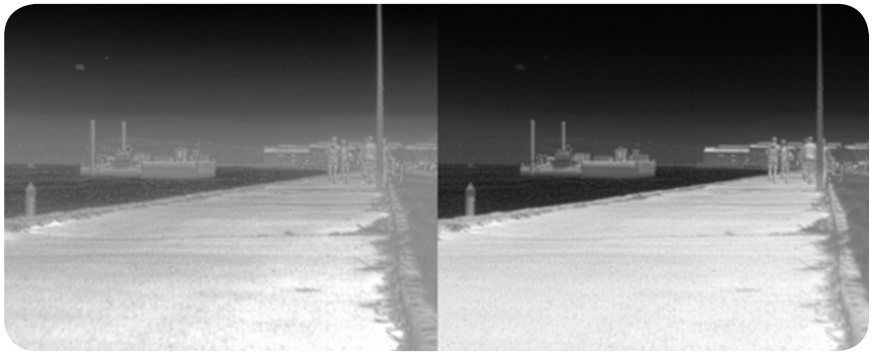
Second Generation DDE – Digital Detail Enhancement™ for clearer imagery and edge sharpening

ACE



"ACE" – Active Contrast Enhancement™ to dynamically adjust contrast for relative scene temperature

IBHEQ

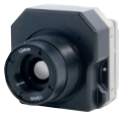


"IBHEQ" – Information Based Histogram Equalization™ automatically adjusts AGC for what matters in a scene

Tau 2

Lens Data





		7.5 mm	9 mm	13 mm
		TAU 2 WIDE FIELD OF VIEW (WFOV) MODELS[1]		
		f/1.25 (**Tau 2** 640 = f/1.4)	f/1.25 (**Tau 2** 640 = f/1.4)	f/1.25
FOV[3] (h x v)	**Tau 2** 640 (17µ 640 x 512)	90° x 69°	69° x 56°	45° x 37°
	Tau 2 336 (17µ 336 x 256)	45° x 35°	35° x 27°	25° x 19°
	Tau 2 324 (25µ 324 x 256)	63° x 50°	49° x 39°	35° x 28°
iFOV (mrads)	**Tau 2** 640 (17µ 640 x 512)	2.267	1.889	1.308
	Tau 2 336 (17µ 336 x 256)	2.267	1.889	1.308
	Tau 2 324 (25µ 324 x 256)	3.333	2.778	1.923
Minimum Focus Distance[4]	All	2.5 cm	3 cm	8 cm
Length[5]	All	19 mm	19 mm	19 mm
Diameter		29 mm	29 mm	29 mm
Weight (Camera + Lens)		<71 g	72 g	<70 g
Detection, Recognition, Identification (DRI)[6] **Typical/Best Conditions** (range in meters)	**Tau 2** 640 & 336 - Man	D = 210/235 R = 52/60 I = 26/30	D = 250/285 R = 63/71 I = 31 /36	D = 390/440 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 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.






19 mm	25 mm	35 mm	50 mm	60 mm	100 mm
		TAU 2 NARROW FIELD OF VIEW (NFOV) MODELS[2]			
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-FPNLX)

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 66 = Standard *(640/60Hz only)* 67 = Shutterless *(640/60Hz only)*	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 A = High Durability X = No Lens		F = Fast (60 Hz, 50 Hz) S = Slow (7.5 Hz, 8.3 Hz)	P = Performance	NL = No Logo *Also used for OEM ID*	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.†

(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. 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 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

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

OUTPUTS

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

OPERATION & CONTROL

Image Control	Invert, revert, continuous digital zoom, dynamic zoom & pan, digital zoom presets,polarity, false color or monochrome, isotherms, AGC, second generation digital detail enhancement (DDE), image optimization (BPR, NUC & AGC'd video),Active Contrast Enhancement (ACE, Information Based Histogram Equalization (IBHEQ), Smart Scene Optimization (SSO), settable splash screens
Camera Control	Manual via SDK & GUI, dynamic range switching (**Tau 2** 324 only)
Signal Interface	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)
FFC Duration	<0.5 sec

PHYSICAL ATTRIBUTES

Size	1.75" x 1.75" x 1.75" (less lens)
Mounting Interface	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

Input Voltage	4.0 – 6.0 VDC
Primary Electrical Connector	50-pin Hirose
Power Dissipation	~ 1.0 W (**Tau 2** 324 & 336); <1.2 W (**Tau 2** 640); <1.3W (Tau 2 640/60Hz)
Time to Image	<5 seconds (**Tau 2** 640); <4 seconds (**Tau 2** 336 and 324)

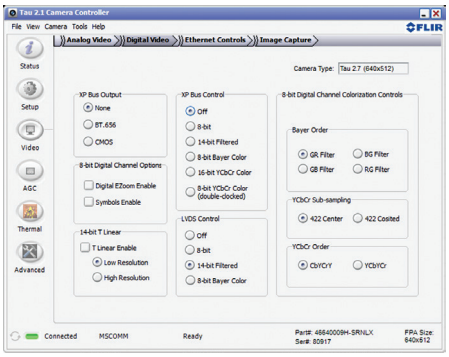
ENVIRONMENTAL

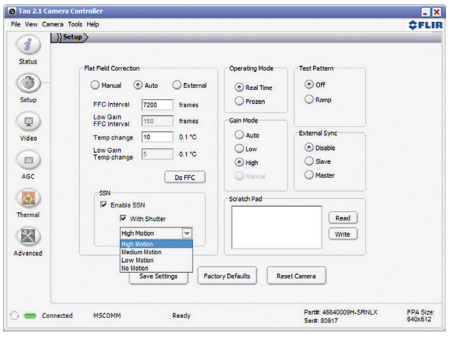
Operating Temperature Range	-40° C to +80° C external temp
Storage Temperature Range	-55° C to +95° C external temp
Scene Temp Range	High gain: -40°C to +160°; Low gain: -40°C to +550°
Shock	200 g shock pulse with 11 msec sawtooth
Temperature Shock	5°/min
Vibration	4.3 g 3 axes, 8 hours each
Humidity	5 - 95% non-condensing
Operational Altitude	+40,000 feet
ROHS, REACH, and WEEE	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	•
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 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	**Tau 2** 324 & 336
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 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.

SANTA BARBARA
FLIR Systems, Inc.
70 Castilian Drive
Goleta, CA 93117
USA
PH: +1 805.690.5097
E-mail: 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