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
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.

17 µm VOx FPA pixels for greater image detail in Tau 2 640 & 336 (25 µm in Tau 324)

High reliability shutter

Rugged, environmental coating on lens flange

Power consumption as low as <1.0 W

Sealed, coated lens

17 in

1.18 in

1.75 in

Three mounting surfaces, each with two M2×0.4 threaded mounting holes

Expansion board accessories: Backward compatibility with Photon; Camera Link

User-definable options: b/w polarity, color video palettes, 2x, 4x & 8x zoom, dynamic zoom & pan, symbology [256 grayscale and 256 colors], video output format, continuous zoom and many others

Digital Detail Enhancement for clearer imagery and edge sharpening

Threaded outer lens barrel and O-ring seal groove with boresight locating pins [WFOV models]

FLIR Uncooled Cores Platforms and Applications

Tens of thousands of FLIR uncooled cores are fielded in:

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

### FOV (h x v)

<table>
<thead>
<tr>
<th>Model</th>
<th>FOV (h x v)</th>
<th>FOV (f/1.4)</th>
<th>FOV (f/1.25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tau 2 640 (17µ 640 x 512)</td>
<td>90° x 69°</td>
<td>69° x 56°</td>
<td>45° x 37°</td>
</tr>
<tr>
<td>Tau 2 336 (17µ 336 x 256)</td>
<td>45° x 35°</td>
<td>35° x 27°</td>
<td>25° x 19°</td>
</tr>
<tr>
<td>Tau 2 324 (25µ 324 x 256)</td>
<td>63° x 50°</td>
<td>49° x 39°</td>
<td>35° x 28°</td>
</tr>
</tbody>
</table>

### iFOV (mrad)

<table>
<thead>
<tr>
<th>Model</th>
<th>iFOV (f/1.25)</th>
<th>iFOV (f/1.25)</th>
<th>iFOV (f/1.25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tau 2 640 (17µ 640 x 512)</td>
<td>2.267</td>
<td>1.889</td>
<td>1.308</td>
</tr>
<tr>
<td>Tau 2 336 (17µ 336 x 256)</td>
<td>2.267</td>
<td>1.889</td>
<td>1.308</td>
</tr>
<tr>
<td>Tau 2 324 (25µ 324 x 256)</td>
<td>3.333</td>
<td>2.778</td>
<td>1.923</td>
</tr>
</tbody>
</table>

### Minimum Focus Distance

<table>
<thead>
<tr>
<th>Model</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>2.5 cm</td>
</tr>
<tr>
<td>All</td>
<td>3 cm</td>
</tr>
<tr>
<td>All</td>
<td>8 cm</td>
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</tbody>
</table>

### Length

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Weight (Camera + Lens)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 mm</td>
<td>&lt;71 g</td>
</tr>
<tr>
<td>29 mm</td>
<td>&lt;70 g</td>
</tr>
</tbody>
</table>

### Detection, Recognition, Identification (DRI)

#### Typical/Best Conditions (range in meters)

<table>
<thead>
<tr>
<th>Model</th>
<th>DRI (m)</th>
<th>DRI (m)</th>
<th>DRI (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tau 2 640 &amp; 336 - Vehicle</td>
<td>580/730</td>
<td>720/880</td>
<td>1,080/1340</td>
</tr>
<tr>
<td>Tau 2 324 - Man</td>
<td>170/185</td>
<td>205/230</td>
<td>300/330</td>
</tr>
<tr>
<td>Tau 2 324 - Vehicle</td>
<td>480/570</td>
<td>590/700</td>
<td>840/1000</td>
</tr>
</tbody>
</table>

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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 have 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) MODELS

<table>
<thead>
<tr>
<th>Lens Focal Length</th>
<th>f/1.25</th>
<th>f/1.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 mm</td>
<td>32° × 26°</td>
<td>25° × 20°</td>
</tr>
<tr>
<td>25 mm</td>
<td>17° × 13°</td>
<td>13° × 10°</td>
</tr>
<tr>
<td>35 mm</td>
<td>24° × 19°</td>
<td>18° × 15°</td>
</tr>
<tr>
<td>50 mm</td>
<td>0.895</td>
<td>0.680</td>
</tr>
<tr>
<td>60 mm</td>
<td>0.895</td>
<td>1.000</td>
</tr>
<tr>
<td>100 mm</td>
<td>1.316</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Tau 2</th>
<th>Tau 2</th>
<th>Tau 2</th>
<th>Tau 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 cm</td>
<td>19 mm</td>
<td>25 mm</td>
<td>35 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>30 cm</td>
<td>17° × 13°</td>
<td>13° × 10°</td>
<td>24° × 19°</td>
<td>0.895</td>
</tr>
<tr>
<td>19 mm</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 mm</td>
<td>25° × 20°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42 mm</td>
<td>13° × 10°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 cm</td>
<td>18° × 14°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62 mm</td>
<td>0.486</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 g</td>
<td>0.714</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Tau 2 Part Number Configuration Guide

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

<table>
<thead>
<tr>
<th>Shutter Type</th>
<th>Resolution</th>
<th>Lens Focal Length</th>
<th>Lens Coating</th>
<th>Video Speed</th>
<th>TAU Type</th>
<th>OEM Info Logo</th>
<th>Expansion Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>46 = Standard</td>
<td>640 (640 × 512)</td>
<td>001 = no lens</td>
<td>H = Hard Carbon</td>
<td>F = Fast (60 Hz, 50 Hz)</td>
<td>P = Performance</td>
<td>NL = No Logo</td>
<td>X = No Card</td>
</tr>
<tr>
<td>47 = Shutterless</td>
<td>336 (336 × 256)</td>
<td>007 = 7.5 mm</td>
<td>X = No Lens</td>
<td>S = Slow (7.5 Hz, 8.3 Hz)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>324 (324 × 256)</td>
<td>009 = 9 mm</td>
<td>013 = 13 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>019 = 19 mm</td>
<td>025 = 25 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>035 = 35 mm</td>
<td>050 = 50 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>060 = 60 mm</td>
<td>100 = 100 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **H** = Hard Carbon
- **X** = No Lens
- **F** = Fast (60 Hz, 50 Hz)
- **S** = Slow (7.5 Hz, 8.3 Hz)
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 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
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 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™ 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 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

<table>
<thead>
<tr>
<th>System Type</th>
<th>Uncooled LWIR Thermal Imager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tau 2 640</td>
<td>640 x 512 VOx Microbolometer</td>
</tr>
<tr>
<td>Tau 2 336</td>
<td>336 x 256 VOx Microbolometer</td>
</tr>
<tr>
<td>Tau 2 324</td>
<td>324 x 256 VOx Microbolometer</td>
</tr>
</tbody>
</table>

**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 Hz (NTSC); 25 Hz (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 customer selectable parallel CMOS; 8-bit BT.656

## Operation & Control

**Image Control**

Invert, revert, continuous digital zoom, dynamic zoom & pan, 2x & 4x digital zoom (8x in Tau 2 640), polarity, false color or monochrome, isotherms, AGC, digital detail enhancement (DDE), image optimization (BPR, NUC & AGC’d video), selectable splash screens

**Camera Control**

Serial commands, SDK & GUI, dynamic range switching

**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

## Radiometric Features

**Isotherms**

See Product Spec

**Spot Meter**

Temperatures measured in central 4x4

**Advanced Radiometry**

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

**Size**

1.75” x 1.75” x 1.18”

**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)

**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**

- **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, B 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**
- **Cameras Control GUI**
- **Camera power and communication over USB**
- **Up to 500g shock tolerance**
- **Eight discrete camera input functions available to OEMs (14bit 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**


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**TAU 2 GUI**

- **Camera Control GUI**
- **Camera power and communication over USB**
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Visit www.flir.com/cvs/cores/knowledgebase to browse the Tau Knowledge Base.