TAU® 2 SERIES

Longwave Infrared Thermal Camera Module

www.flir.com/tau-series

TAU® 2 SERIES

Designed for integrators to reduce development risk and shorten time to market.

The Tau 2 series offers 40 variants of the most reliable and rugged longwave infrared (LWIR) camera module from Teledyne FLIR. Equipped with a simple optical interface and common commercial interfaces, integration with the Tau 2 series is seamless.

TAU 2+   Longwave Infrared Thermal Camera Module
with Enhanced Performance and Increased Sensitivity

Made in USA, the Tau 2+ is the most advanced, highest performance longwave infrared (LWIR) Tau 2 camera model from Teledyne FLIR. It maintains the widely deployed and real-world-tested Tau 2 mechanical, electrical, and optical interfaces allowing plug-and-play with existing designs. Its new 1.5x sensitivity improvement and an entirely redesigned image processing engine deliver dramatically enhanced scene contrast and sharpness. Tau 2+ is the go-to thermal camera module for the most challenging environments, including detection of the smallest, hardest to find targets over long distances. Enhanced LWIR thermal performance and market-leading reliability provide low-risk development in the short run and the long run, making it the ideal thermal camera module for unmanned vehicles, security applications, and thermal sights.

DETECT OBJECTS AT GREATER DISTANCES

NEDT of <25 mK extends detection, recognition, and identification (DRI) performance

- 1.5x increase in thermal sensitivity
- 640 x 480 VGA resolution
- Simple optical interface accommodates integrator-designed optics

RESOLVE KEY INFORMATION WITH SHARPER IMAGES AND IMPROVED CONTRAST

Best-in-class image processing algorithm provides clearer thermal details in challenging environments

- New level of minimum resolvable of temperature difference (MRTD)
- Low image noise
- Improves scene contrast with blacker blacks and whiter whites

TAU 2

Longwave Infrared Thermal Camera Module

Made in USA, Tau 2 thermal imaging cameras offer an unmatched combination of features and reliability, making them well-suited for demanding applications including unmanned vehicles, thermal sights, and handheld imagers. Improved electronics provide powerful image processing modes that dramatically improve detail and contrast through continuous histogram equalization in both 640 and 336 resolutions.

Available in Commercial, Performance, and Industrial variants, each with unique sensitivity and pixel operability thresholds to meet operational requirements. Radiometry is an optional feature for Performance-grade cameras, and standard feature with Industrial-grade. All Tau 2 configurations and resolutions share electrical, mechanical, and optical interfaces allowing integrations to be designed that work seamlessly with all formats.

ADVANCED IMAGE PROCESSING AND FEATURE SET

Advanced electronics and image processing provide clearer imagery, edge sharpening, and contrast

- 640 and 336 resolutions
- Advanced Detail Enhancement (ADE)
- Information Based HEQ automatically adjusts AGC
- Shutterless NUC for continuous image improvement

RELIABLE PERFORMANCE WITH ACCURATE TEMPERATURE MEASUREMENT

Deployed in products worldwide requiring radiometry and analytics

- Radiometry available in Performance and Industrial grades
- Adjustable isotherm thresholds colorize temperatures of interest
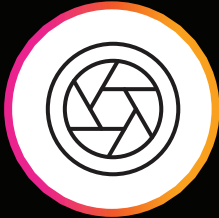- Comprehensive product documentation

SPECIFICATIONS

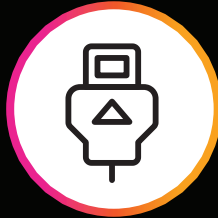| System Overview	TAU 2+	TAU 2
Thermal Resolution	VGA - 640 x 512 VOx Microbolometer	VGA - 640 x 512 VOx Microbolometer QVGA - 336 x 256 VOx Microbolometer
Pixel Size	17 µm	
Spectral Band	7.5 - 13.5 µm	
Sensitivity (NEdT)	<25 mK	Industrial: <30 mK, Performance: <40 mK Commercial: <50 mK
Video pipeline	Extra-sharp DDE	Standard DDE
Scene Dynamic Range	0 °C to +80 °C	High gain: -25 °C to +100 °C Low gain: -40 °C to +550 °C
Radiometry Option	No	Yes
Low-gain Mode Available	No	Yes
Outputs		
Analog Video	640 x 480 (NTSC); 640 x 512 (PAL)	
Exportable Frame Rates	30 Hz (NTSC); 25 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 • Automatic Gain Correction (AGC), second generation	• Image optimization (BPR, Non-Uniformity Correction (NUC) - & AGC'd video) • Smart Scene Optimization (SSO) • Settable splash screen • Advanced Detail Enhancement (ADE) • Active Contrast Enhancement (ACE, Information Based Histogram Equalization (IBHEQ) *TAU 2 only*
Camera Control	Manual via SDK & GUI	
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 1.18″ (Standard Version) 1.5″ x 1.5″ x 1.18″ (Compact and Shutterless)	
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	<1.2 W (Tau 2/Tau 2+ 640); ~ 1.0 W (Tau 2 336);	
Time to Image	<5 seconds (Tau 2/Tau2+ 640); <4 seconds (Tau 2 336)	
Environmental		
Operating Temperature Range	-40 °C to +80 °C external temp	
Storage Temperature Range	-55 °C to +95 °C external temp	
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	

INTEGRATION MADE EASY

Common interfaces and access to US-based Technical Services team reduce development risk and shorten your time to market. The Tau 2 series offer an unmatched set of features and capabilities, making them well-suited to many demanding applications including UAVs, handheld imagers, security cameras, maritime cameras and thermal sights.

OPTICS

The simple optical interface accommodates integrator-designed optics and the industry's widest variety of lens options available.

INTERFACES

Commercial interfaces including USB, CMOS, Camera Link, or Ethernet. are all available with the Tau 2 series.
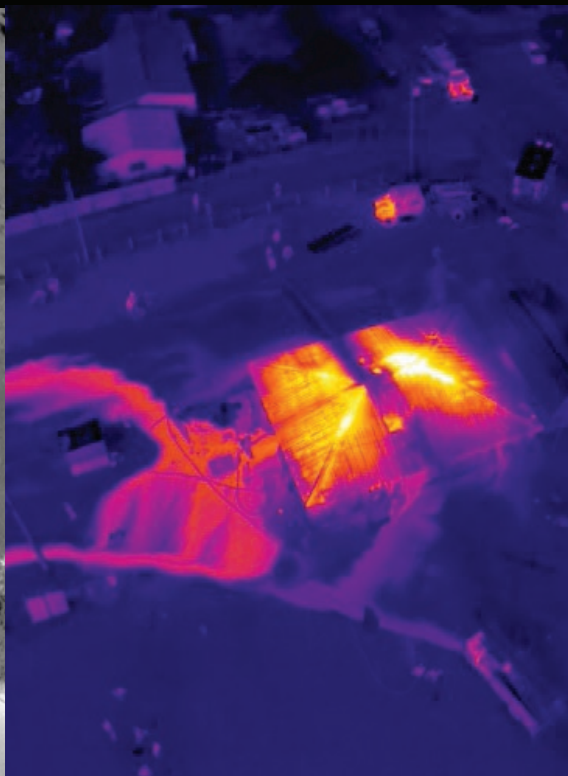
SUPPORT

When developers need asssistance, our highly qualified Technical Services team are available to support integration wherever you need it.

To learn more, please visit **www.flir.com/tau-series** to connect with a representative.

TAU 2+ Sample imagery

TAU LENSES

		7.5 mm	9 mm	13 mm
		WIDE FIELD OF VIEW (WFOV) MODELS[1]		
		f/1.25 **Tau 2/2+** 640 = f/1.4	f/1.25 **Tau 2/2+** 640 = f/1.4	f/1.25
FOV[3] **(h × v)**	**Tau 2/2+** 640 (17µ 640 × 512)	90° × 69°	69° × 56°	45° × 37°
	Tau 2 336 (17µ 336 × 256)	45° × 35°	35° × 27°	25° × 19°
iFOV (mrads)	**Tau 2/2+** 640 (17µ 640 × 512)	2.267	1.889	1.308
	Tau 2 336 (17µ 336 × 256)	2.267	1.889	1.308
Minimum Focus Distance[4]	All	2.5 cm	3 cm	8 cm
Length[5] **Diameter** **Weight (Camera + Lens)**	All	19 mm 29 mm <71 g	19 mm 29 mm 72 g	19 mm 29 mm <70 g

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.

	19 mm	25 mm	35 mm	50 mm	60 mm	100 mm
			NARROW FIELD OF VIEW (WFOV) MODELS[2]			
	f/1.25	f/1.1	f/1.2	f/1.2	f/1.25	f/1.6
	32° × 26°	25° × 20°	18° × 14°	12.4° × 9.9°	10.4° × 8.3°	6.2° × 5.0°
	17° × 13°	13° × 10°	9.3° × 7.1°	6.5° × 5.0°	5.5° × 4.2°	3.3° × 2.5°
	0.895	0.680	0.486	0.340	0.283	0.170
	0.895	0.680	0.486	0.340	0.283	0.170
	16 cm	30 cm	60 cm	1.5 m	2.3 m	7 m
	19 mm	30 mm	39 mm	62 mm	62 mm	110 mm
	29 mm	42 mm	42 mm	58 mm	61 mm	82 mm
	<70 g	112 g	150 g	280 g	200 g	479 g

TAU 2 PART NUMBER CONFIGURATION GUIDE (EX: 46640019HS-FPNLX)

46	**640**	**019**	**HS**	– **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 48 = Iris Shutter	640 (640 × 512) 336 (336 × 256)	001 - no lens 006 - 6.8 mm* 007 - 7.5 mm 009 - 9 mm 013 - 13 mm 019 - 19 mm 025 - 25 mm W35 - 35 mm wide 035 - 35 mm 050 - 50 mm 060 - 60 mm 100 - 100 mm *Tau 2 336 only	H = Hard Carbon HS = Tau 2+ X = No Lens N = No Temp Sensor	F = Fast (30 Hz NTSC, 25 Hz PAL)* S = Slow (7.5 Hz NTSC, 8.3 Hz PAL) *Tau 2 336 = 60 Hz NTSC, 50 Hz PAL	P = Performance R = Advanced Radiometry I = Industrial* C = Commercial *Includes Advanced Radiometry	NL = No Logo (Last 3 characters also used to describe/define OEM configuration)	X = None (Expansion boards are optional accessories that may be factory-installed)

TAU ACCESSORIES

There are several Tau-specific accessories available. Please contact Teledyne FLIR for details.

VPC Breakout Module

VPC
Module Installed

VPC BREAKOUT MODULE
Provides video, power, and communications interface.
(P/N: 421-0039-00)

Tripod Adapter

Inverted with
Tripod Adapter Installed

TRIPOD ADAPTER
Allows users to put Tau 2 on a standard tripod mount.
(P/N: 261-2071-00)

Camera Link Board

Camera Link
Board Installed

CAMERA LINK EXPANSION BOARD
Furnishes 14-bit digital data with separate connectors for analog video, power and communication. †
(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.

LENS FOCUS TOOL
Lets users adjust the focus of 9 mm,
13 mm, and 19 mm lenses.
(P/N: 421-0037-00).

LENS LOCKING RING
Lets users mount WFOV Tau cameras
to a bulkhead.
(P/N: 421-0041-00)

NARROW FIELD OF VIEW LENS HOLDER AND CLAMP
(P/N: 261-1485-00)

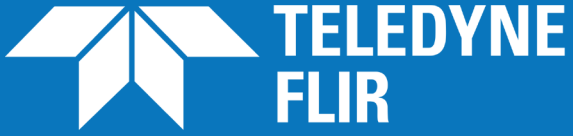## 4" BLACKBODY SOURCE FOR LENS CALIBRATION & SUPPLEMENTAL FFC
(P/N: 285-0029-02)

ABOUT TELEDYNE FLIR

Teledyne FLIR designs, develops, manufactures, markets, and distributes technologies that enhance perception and awareness. We bring innovative sensing solutions into daily life through our thermal imaging, visible-light imaging, video analytics, measurement and diagnostic, and advanced threat detection systems.

Teledyne FLIR offers a diversified portfolio that serves a number of applications in government & defense, industrial, and commercial markets. Our products help first responders and military personnel protect and save lives, promote efficiency within the trades, and innovate consumer-facing technologies. Teledyne FLIR strives to strengthen public safety and well-being, increase energy and time efficiency, and contribute to healthy and intelligent communities.

TELEDYNE FLIR

GOTHERMAL
INNOVATIVE SENSING SOLUTIONS

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