

Tau Half Zoom Configuration

Application Note



FLIR Commercial Systems

70 Castilian Drive
Goleta, CA 93117
Phone: +1.805.964.9797
www.flir.com

Document Number: 102-PS242-100 REV 121

Version: 1321

Issue Date: April 2014

1 Table of Contents

Tau	1
Half Zoom Configuration	1
Application Note	1
Document Number: 102-PS242-100 REV 120.....	1
1.0 Document.....	3
1.1 Revision History	3
1.2 Scope.....	3
2.0 Description of Feature.....	4
2.1 Tau 2 Half Zoom Variants	4
2.2 Camera Outputs	5
2.2.1 LVDS video:	5
2.2.2 CMOS video:	5
2.2.3 Pan/Tilt.....	5
2.2.4 Video Color.....	5
2.2.5 BT.656:	5
2.2.6 Analog output:	6
2.3 Zoom Software Controls.....	6
2.4 AGC	6
2.4.1 AGC Range	6
2.4.2 AGC ROI	6
2.5 Tau GUI Support for Half Zoom	7
2.6 On Screen Symbols.....	7
2.7 Discrete Pin Function.....	10

2 Table of Figures

Figure 1. Example image of Half Zoom.	8
Figure 2. Example image of 1X Zoom.	8
Figure 3. Example image of 2X Zoom.	9
Figure 4. Example image of 4X Zoom.	9

1.0 Document

1.1 Revision History

Version	Date	Comments
100	6/26/2013	Initial Release
110	8/29/2013	Add limitation on 60Hz/50Hz operation. Modified AGC description for 0.5X zoom mode.
111	09/12/2013	Updated discrete table
120	11/19/2013	Updated for general release. Included more explanation of features of zoom capability.
121	4/21/2014	Clarification of zoom features.

1.2 Scope

This Application Note describes the operational controls of a special Tau2 324/336 configuration with the ability to zoom to 0.5X, 1X, 2X and 4X. This feature is only available on Tau2 324/336 cameras with a specific firmware/software load. This option is available to OEM customers only and it is not currently a feature for all general Tau customers. If this feature is desired for a different camera, please contact your sales person to request a specific OEM part number and identify the lens type requested.

Here is a sample of some of the resources that can be found on the FLIR website:

Document Title	Document Number	Description
Tau Quick Start Guide	102-PS242-01	Quick Start Guide for first-time use
FLIR Camera Controller GUI User's Guide	102-PS242-02	Detailed Descriptions for functions and adjustments for FLIR cameras using the FLIR Camera Controller GUI
Tau 2 Electrical IDD	102-PS242-41	Written for Electrical Engineers to have all necessary information to interface to a Tau 2 camera
Tau 2/Quark Software IDD	102-PS242-43	Written for Software Engineers to have all necessary information for serial control of Tau 2 and Quark
Assorted Mechanical Drawings and Models	Various	There are drawings and 3D models for various camera configurations for mechanical integration
Application Notes	Various	Written for Systems Engineers and general users of advanced features such as Gain Calibration, Supplemental FFC Calibration, NVFFC Calibration, Bad Pixel Killing, detailed use of CameraLink, CameraLink Accessory Modifications, On-Screen Symbology, AGC/DDE explanation, Camera Mounting, Spectral Response, Optical Interface for lens design, and others.

There is also a large amount of information in the Frequently Asked Questions (FAQ) section on the FLIR website: <http://www.flir.com/cvs/cores/knowledgebase/>. Additionally, a FLIR Applications

Engineer can be contacted at 888.747.FLIR (888.747.3547).

Description of Feature

The Tau2 half zoom feature is only available on 324x256 and 336x256 sensors (not the 640). This build will include the same features described in the Tau 2 literature for the 324/336 configuration except as described in this document. This version will be a variant of the Tau 2.4 release and upgrades to future Tau 2 releases will not necessarily support these features. Quark does not currently support this feature. This feature only works in 30Hz/25Hz (NTSC and PAL) mode or the sub-9Hz equivalent. *It does not work in 60Hz/50Hz mode.*

2.1 Tau 2 Half Zoom Variants

The Tau 2 half zoom variant is available in the 324 25um and 336 17um version. *It is not available in a 640 17um pixel version.* The Tau 2 Half Zoom feature displays the native resolution of the sensor and will not interpolate up to a VGA resolution while in ½ zoom.

The part numbers for the Half Zoom version are:

46324001X-FPHF2 / 46336001X-FPHF2, 30Hz/25Hz lensless

46324001X-FPHF2 / 46336001X-SPHF2, sub-9Hz Lensless

And with the lens attached

46324YYYH-FPHF2* / 46336YYYH-FPHF2*, 60Hz/50Hz lensless

46324YYYH-FPHF2* / 46336YYYH-SPHF2*, sub-9Hz Lensless

* Where YYY is the lens variant described in Table 1. Not all part numbers may be released in SAP but will be based on customer's requests and specific OEM numbers opened for the customer.

Table 1. Tau 2 lenses available.

YYY	Lens focal length
007	7.5mm
009	9mm
013	13mm
019	19mm
025	25mm
035	35mm
W35	W35mm
050	50mm
060	60mm
100	100mm

2.2 Camera Outputs

The Tau 2 camera has several output interfaces. These will remain the same as the general Tau release except where noted here.

2.2.1 LVDS video:

Format 324/336x256 14-bit, 0.5X zoom is not available. Output is the same as normal Tau2 cameras.

Format 640x512 8 bit AGC corrected, 0.5X zoom is available. The blank area outside the image in 0.5X zoom mode will have a value of zero.

2.2.2 CMOS video:

Format 324/336x256 14-bit, 0.5X zoom is not available. Output is the same as normal Tau2 cameras.

Format 640x512 8 bit AGC corrected, 0.5X zoom is available. The blank area outside the image in 0.5X zoom mode will have a value of zero.

2.2.3 Pan/Tilt

The Pan/Tilt controls will be available but the width/height will be limited by the amount of zoom applied. The 0.5X zoom will not have the ability to Pan/Tilt. Pan/Tilt will operate only when zoomed in beyond the 0.5X zoom mode. For example, you can Pan/Tilt in 0.8X mode but not in 0.5X mode.

All Tau2s have the ability to pan and tilt beyond the normal boundaries. The table below is in the format of the FLIR SWIDD and shows the command to enable pan and tilt beyond the normal limits.

0x70	PAN_AND_TILT	setPanTilt	4	4	Byte 0-1: rowOffset; Byte 2-3: columnOffset;	rowOffset: (tilt position), 68 to -68; columnOffset: (pan position), 81 to -81;
		setPanTiltIgnoreLimits	6	6	Byte 0-1: const_0x0000; Byte 2-3: rowOffset; Byte 4-5: columnOffset;	const_0x0000; rowOffset: Ignores pan/tilt limits; columnOffset: Ignores pan/tilt limits;

2.2.4 Video Color

The video color displayed in the BT.656 and analog video is determined by the Tau LUT file. The Half Zoom camera configuration has a special LUT file which has color 0 set to the fill color for all LUTs.

2.2.5 BT.656:

640x480 NTSC resolution (525/60) or 640x512 PAL resolution (625/50). PAL format will have additional black bars around active image to achieve correct aspect ratio. At zoom levels less than 1X there will be black borders.

Zoom available: 0.5X, 1X, 2X, 4X.

E-zoom will function for level between 0.5X and 4X.

Note: The commands for 0.5X to 4X will be represented by 1X to 8X in the GUI and serial commands.

2.2.6 Analog output:

NTSC or PAL. PAL format will have additional black bars around active image to achieve correct aspect ratio. At zoom levels less than 1X the border will be black in color.

Zoom available 0.5X, 1X, 2X, 4X.

E-zoom will function for levels between 0.5X and 4X.

Note: The commands for 0.5X to 4X will be represented by 1X to 8X in the GUI and serial commands.

2.3 Zoom Software Controls

The 0.5X zoom feature will be controlled by the 0x32 e-zoom control. The Zoom state will be savable and power cycle persistent.

In the 'Unzoom' mode the display will have black borders and the qVGA resolution is not interpolated up to VGA resolution in the analog mode. Customers can use the digital zoom (e-zoom) feature to move from 0.5X zoom to 1X zoom. Doing so will move from a 320 image with black bars to an image that fills the whole display (no black boards in NTSC). Zoom up to 4X is supported with this build and the 324/336 detectors.

The commands for 0.5X to 4X will be represented by 1X to 8X in the GUI and serial commands. A value of 1X in the software will correspond to a 0.5X zoom output and an 8X zoom in the software will correspond to an actual 4X zoom on the display. No actual 8X zoom is achievable with this feature and the maximum zoom allowed for a 324/336 sensor is still 4X as our other documentation will show.

2.4 AGC

The Half Zoom feature only operates on the AGC corrected 8-bit data. 14 bit output is unchanged from standard Tau 2.

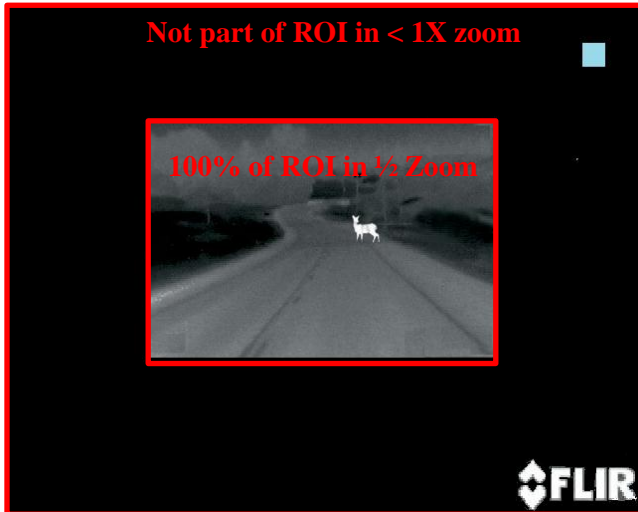
2.4.1 AGC Range

The standard Tau 2 AGC converts the 14-bit data range (0-16383) into the 8-bit data range (0-255). The Half Zoom AGC has an 8-bit range limited to 1-255 because level zero is used by the fill value.

2.4.2 AGC ROI

The AGC ROI window setting usually corresponds to 100% of what is on the display. With this 0.5X zoom configuration this is still true for all zoom levels equal to or greater than 1X (1.01X through 8X). When using a scale factor less than 1X (.5X through .99X) the AGC ROI window is 100% of the active pixels. This effectively means the black borders will never be considered as part of the AGC ROI and only the active pixel area will be used.

For example:



AGC ROIs between 50% and 100% use a window that is the size of the active pixel area.



Once the camera is in a 1X zoom the display is used for the AGC window. When the image is zoomed in to fill the entire display then the normal functionality of cameras is identical to other documentation including the FLIR camera controller GUI users' guide.

2.5 Tau GUI Support for Half Zoom

The Tau GUI will support this feature. If you enable 'unzoom' the image will be just the 320 image in the center screen (with black borders). For 2X zoom you will fill the full VGA display when using 8 bit video. See Figures 1-4 for more information.

2.6 On Screen Symbols

The Tau on screen symbols will be described by the Tau Symbols Application note 102-PS242-100-08. The default factory symbols will be placed in the 640x512 analog/BT.656 window regardless of zoom

level applied as shown in Figure 1 through Figure 4. For example, if you enable the temperature bar graph it will be shown in the black portion of the image when set to Half Zoom.

Tau cameras normally include a 2X and 4X indicator in the lower center of the display for 2X and 4X zoom respectively, and there is no indicator for 1X zoom. The factory zoom symbol for this configuration shall be the same as the standard Tau cameras. An option to delete the zoom symbols with a field upgrade file is available (no_zoom_symbols.pcf)

The standard Tau camera has a Flat Field Correction Imminent indicator in the upper right hand corner of the screen. This configuration has the same FFC indicator as the standard Tau. The FFC indicator can be turned off with by setting the FFC warn time indicator to zero. Notice that the FFC indicator is displayed in the black portion of the screen as shown below when in Half Zoom mode.



Figure 1. Example image of Half Zoom. This can be achieved by clicking ‘Unzoom’ in the GUI. No zoom indicator, and FFC icon in upper right. Sensor resolution = Display resolution. (FLIR logo present in some versions.)



Figure 2. Example image of 1X Zoom. This can be achieved by clicking ‘Zoom 2X’ in the GUI.

No zoom indicator, and FFC icon in upper right. One pixel on sensor = 2x2 on display. (FLIR logo present in some versions.)



Figure 3. Example image of 2X Zoom. This can be achieved by clicking 'Zoom 4X' in the GUI. No zoom indicator, and FFC icon in upper right. Image shown with Zoom level indicator off. One pixel on sensor = 4x4 on display. (FLIR logo present in some versions.)



Figure 4. Example image of 4X Zoom. This can be achieved by clicking 'Zoom 4X' in the GUI. No zoom indicator, and FFC icon in upper right. FLIR logo present in some versions. Image shown with Zoom level indicator off. One pixel on sensor = 8x8 on display. Since the 'unzoom' mode is actually the native resolution of the sensor, the camera will support up to 8X zoom (instead of the normal 4X zoom in a normal Tau2 320 camera, see section 2.3 for more information).

2.7 Discrete Pin Function

A discrete pin function file will be loaded into this camera configuration with the functions described in Table 2.

Table 2 Discrete function pinout table.

50-pin connector	Tau name	Function	Detail
19	Discrete 0	Not defined	Note 6
20	Discrete 1	Not defined	Note 6
23	Discrete 2	Do FFC	Note 1
24	Discrete 3	FFC imminent	Note 2
25	Discrete 4	FFC mode	Note 3
26	Discrete 5	LUT Toggle	Note 4
3	Discrete 6	Not defined	Note 6
4	Discrete 7	Zoom Toggle	Note 5

Note 1. This function is required for effective use of Shutterless Tau cameras. The application of Positive going edge to this pin shall perform the Do FFC function (0x12 command).

Note 2. This pin be normally at 0V and change to 3.3V when the FFC imminent Icon is present on the analog display. The FFC_Warn_time command (0x3C) shall control both the analog icon and this pin.

Note 3. This function is required to enable additional user control of camera. The default state is Automatic mode with the input at 3.3 volts held by an internal pull-up. When the signal is pulled to zero volts the camera will switch into Manual mode. The FFC_Mode_Select (0x11 0=manual, 1=automatic) command has equal precedence with the discrete pin and the camera will be in the last state set by either the discrete or serial command. The camera will power up in the saved default state and switch to the discrete input defined state when the pin state is changed.

Note 4. This function will change the color LUT from the current value to the next LUT in the table when the Discrete pin transitions from the floating state to the ground state. No LUT change happens on the transition from ground to float. The LUT state after LUT14 will be LUT1.

Note 5. This function will change the current zoom state from 0.5X to 1X to 2X to 4X zoom then repeat whenever the discrete pin changes from the float state to the ground state. The e-zoom command (0x32) has equal precedence with this command.

Note 6. Not defined. Connection of either 3.3V or 0V to this pin will have no effect on camera operation.

3 Known Bugs

1. Tearing when switching between zoom levels with slow configurations.
2. IceFire LUT has blue border in <1X zoom.

© FLIR Commercial Systems, 2014. All rights reserved worldwide. No parts of this manual, in whole or in part, may be copied, photocopied, translated, or transmitted to any electronic medium or machine readable form without the prior written permission of FLIR Commercial Systems

Names and marks appearing on the products herein are either registered trademarks or trademarks of FLIR Commercial Systems and/or its subsidiaries. All other trademarks, trade names, or company names referenced herein are used for identification only and are the property of their respective owners.

Liberation fonts are copyright 2009 by RedHat and are used under authority of the GNU public license. Information about these fonts and the GNU public license can be found at:
<https://www.redhat.com/promo/fonts/>.

This product is protected by patents, design patents, patents pending, or design patents pending.

If you have questions that are not covered in this manual, or need service, contact FLIR Commercial Systems Customer Support at 805.964.9797 for additional information prior to returning a camera.

This documentation is subject to change without notice.



This equipment must be disposed of as electronic waste. Contact your nearest FLIR Commercial Systems, Inc. representative for instructions on how to return the product to FLIR for proper disposal.

FCC Notice. This device is a subassembly designed for incorporation into other products in order to provide an infrared camera function. 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 an infrared camera function. 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 un autre produit afin de fournir une fonction de caméra infrarouge. 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 le matériel brouilleur pour les appareils numériques (NMB-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 an infrared camera function. 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.