TELEDYNE
FLIR OEM

INTRODUCTION

BOSON SX8 GUI

WWW.OEM.FLIR.COM/BOSONSX8

102-2065-41 REV 100

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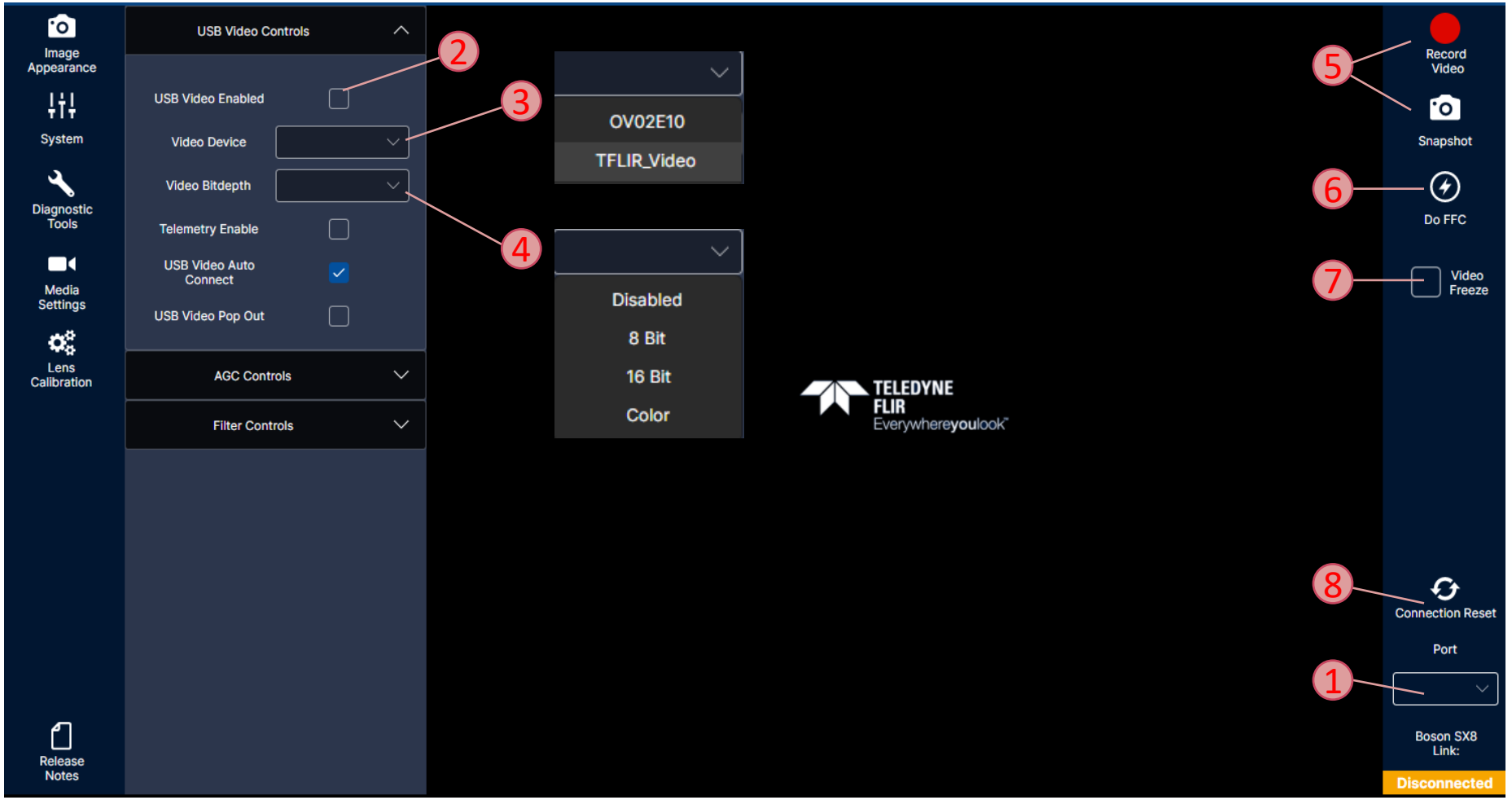
1.0 QUICK START GUIDE



1. **Select Boson COM port**

2. **Enable USB Video**

3. **Select FLIR Video**

4. **Select Video Bitdepth**

8 Bit- Full AGC
16 Bit- Pre-AGC

5. **Capture video or images**

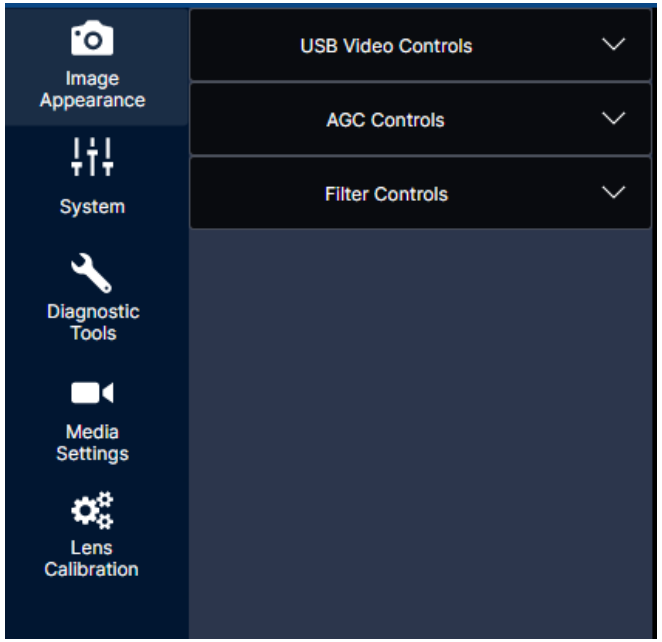
Note: If recording 16-bit video, the record will auto-terminate after 5 minutes if there is no defined value or if the value is 0 in the capture time field.

6. **Do FFC (see section 2.3 & 3.1)**

7. **Freeze video stream**

8. **If video freezes or the Boson's COM port does not show up in the port selector, click connection reset and follow the steps above**

2.0 IMAGE APPEARANCE



Adjusts how the video image looks.

USB Video Controls:

- Settings to connect to camera over USB

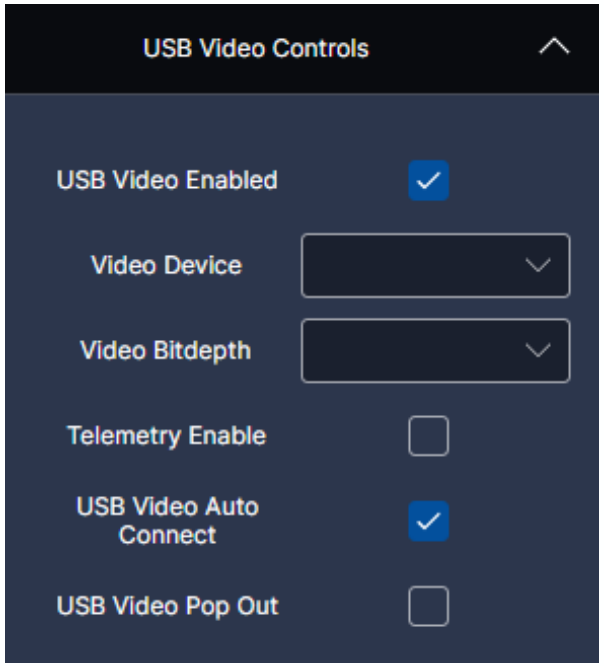
AGC (Automatic Gain Control) Controls :

- Controls how thermal data is mapped to grayscale or color
- Primary tool for improving visibility of hot/cold objects

Filter Controls:

- Apply image processing filters, e.g., edge enhancement, smoothing
- Used to sharpen details or reduce noise depending on scene conditions

2.1 USB VIDEO CONTROLS



USB Video Enabled: Turns USB video output on/off

Video Device: Select the TFLIR_Video device for SX8 video streaming

Video Bitdepth: Choose output bit depth

- Disabled: Turns off USB video output
- 8-bit (Post-AGC):
  - Applies AGC (Automatic Gain Control) first, then outputs an 8-bit display-ready image
  - Best for viewing, demos, and applications needing standard video format
- 16-bit (Pre-AGC):
  - Raw thermal data before AGC; preserves full radiometric range
  - Best for image processing, analytics, and applications with maximum detail
- Color: 8-bit video with the active color palette applied (RGB)

Telemetry Enable: Overlays camera telemetry data on the video stream, e.g., timestamp, FFC status, internal temperature, system info

USB Video Auto Connect: Auto-reconnects video when the camera is detected

USB Video Pop Out: Opens the live video in a separate pop-out window

2.2 AGC CONTROLS

Polarity:

- Switches output palette orientation (White Hot ↔ Black Hot) by inverting the 8-bit data

EQ Mode (Histogram Equalization):

- Enables Information-Based Equalization, which redistributes gray levels to maximize scene detail (recommended default)
- When EQ Mode is disabled:
  - The camera uses Plateau Equalization, which redistributes gray levels based purely on pixel population, increasing contrast in dominant regions but not prioritizing fine detail

Tail Rejection (Outlier Cut):

- Removes extreme hot/cold pixels from the histogram
- Higher values increase contrast in the central scene but may wash out small hot/cold objects

Max Gain

- Limits maximum contrast stretch
- Higher = more contrast but more noise; lower = smoother, lower-contrast image

2.2 AGC CONTROLS

Adaptive Contrast Enhancement (ACE):

- Adjusts brightness/contrast based on scene temperature
- Lower values darken image and boosts hot-object contrast; higher values brighten image and boosts cold-object contrast

Linear Percent:

- Mixes linear mapping with AGC mapping
- Higher values preserve temperature relationships; lower values maximize local contrast

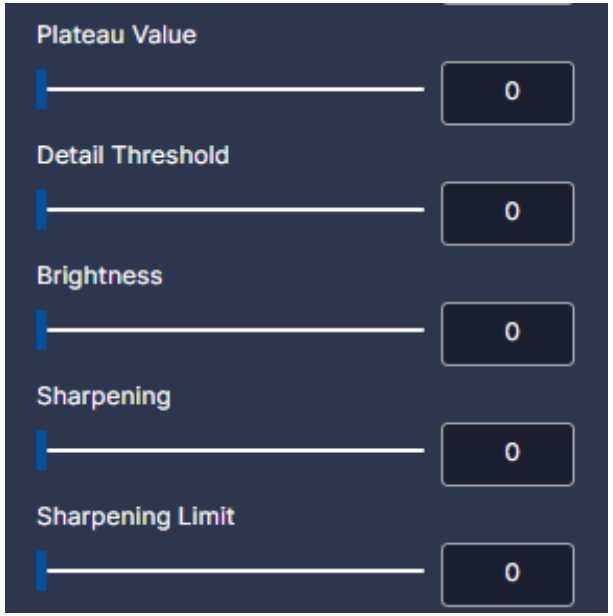
Damping Factor:

- Controls AGC update speed when the scene changes
- Lower = faster adjustments (may flicker); higher = smoother transitions

Detail Headroom:

- Reserves part of the 8-bit range for high-pass detail (DDE)
- Higher values improve detail but reduce low-pass image (general brightness structure of the scene) contrast

2.2 AGC CONTROLS



Plateau Value

- Limits how much a dominant region of the image can consume gray levels
- Lower = more even distribution; higher = classic histogram equalization behavior

Detail Threshold

- Digital Detail Enhancement (DDE) prevents noise from being enhanced in smooth areas; only real edges/textures get sharpened
- Detail threshold is a part of DDE that sets minimum change required for detail enhancement to activate

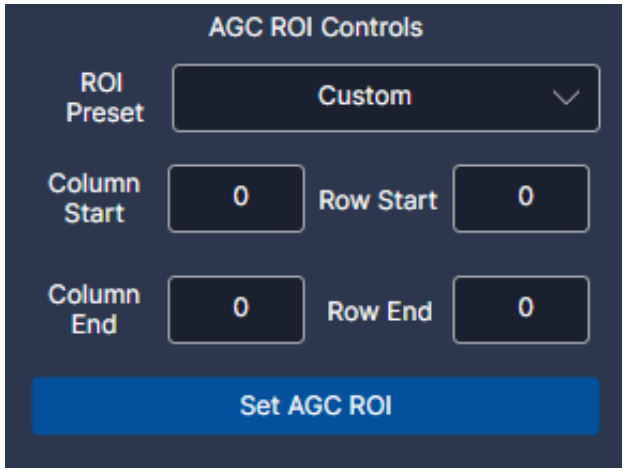
Brightness

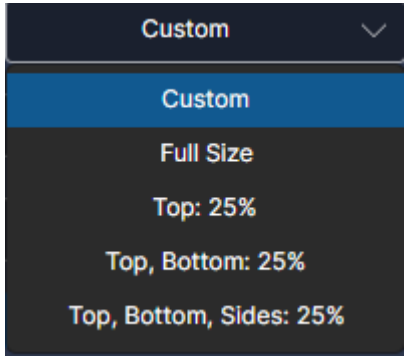
- Shifts overall AGC output level (post-mapping offset)

Sharpening / Sharpening Limit

- Part of Digital Detail Enhancement (DDE)
- Higher sharpening increases fine detail but increases visible noise; limit caps the maximum sharpening gain

2.2 AGC CONTROLS





AGC ROI (Region of Interest) Controls:

- ROI limits which part of the image influences AGC
- Useful when a portion of the scene, e.g., sky, horizon, background, dominates the histogram and reduces contrast in important areas
- Select the 'Set AGC ROI' button to set desired AGC controls

ROI Preset:

- Selects a predefined Region of Interest shape
  - Custom: User-defined ROI using Column/Row Start/End fields
  - Full Size: Entire frame is used for AGC (default behavior)
  - Top: 25%: Excludes the top 25% of the image from AGC
  - Top, Bottom: 25%: Excludes the top and bottom 25% of the frame
  - Top, Bottom, Sides: 25%: Excludes 25% from all edges; uses only the center box for AGC

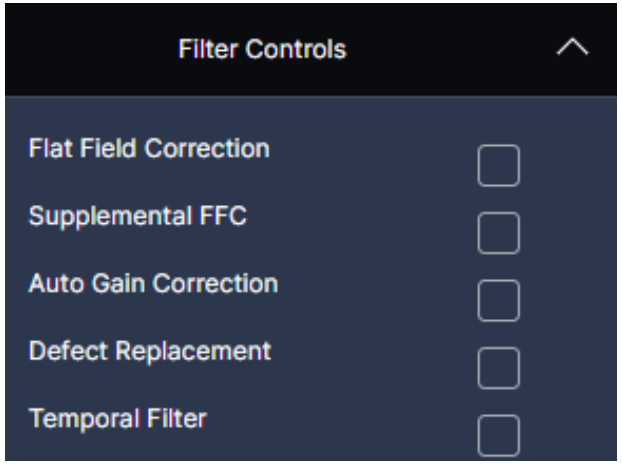
Column Start / Column End:

- Defines the left and right boundaries of the ROI (in pixel coordinates)
- Pixels outside this horizontal range are ignored when calculating AGC

Row Start / Row End:

- Defines the top and bottom boundaries of the ROI
- Pixels outside this vertical range are not included in AGC processing

2.3 FILTER CONTROLS



Flat Field Correction (FFC):

- Creates a uniformity map to remove fixed-pattern noise and maintain image quality
- Requires imaging a uniform surface (internal shutter or external blackbody)

Supplemental FFC:

- Adds additional correction to account for the signal from the camera housing; improves uniformity

Auto Gain Correction:

- Automatically adjusts internal gain to maintain stable image brightness

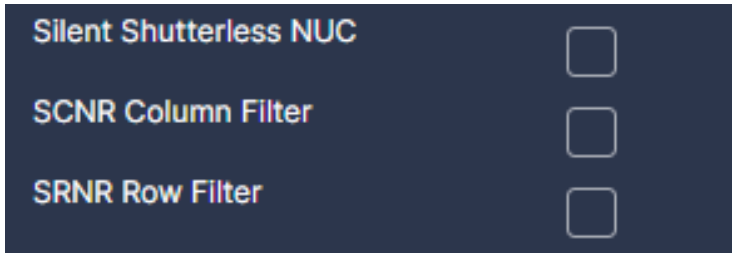
Defect Replacement:

- Detects and replaces bad pixels using neighboring pixel values

Temporal Filter:

- Reduces temporal (frame-to-frame) noise by averaging over time

2.3 FILTER CONTROLS



Silent Shutterless NUC:

- Applies shutterless non-uniformity correction without mechanical shutter activity

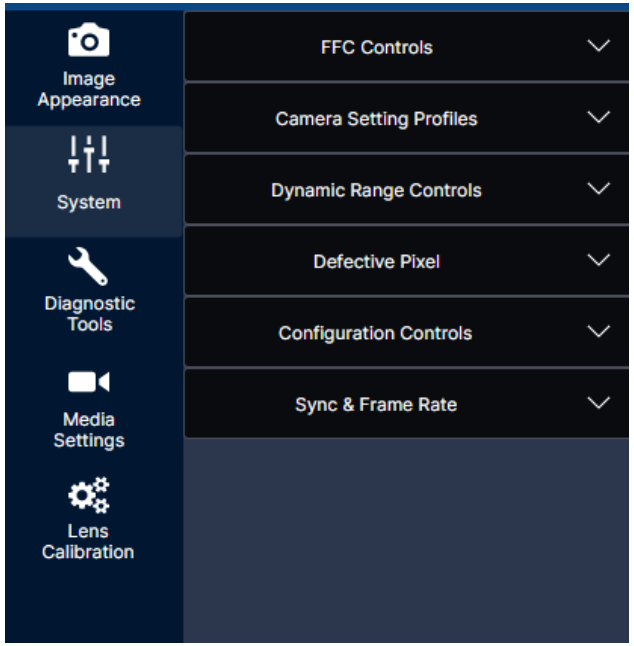
SCNR Column Filter:

- Suppresses column-based fixed-pattern noise

SRNR Row Filter:

- Suppresses row-based fixed-pattern noise

3.0 SYSTEM



FFC Controls:

- Adjust Flat Field Correction (FFC) behavior (Auto/Manual/External), timing, temperature thresholds, and integration settings

Camera Setting Profiles:

- Save, load, and switch between predefined camera configurations

Dynamic Range Controls:

- Manage gain states, temperature ranges, and settings affecting radiometric dynamic range

Defective Pixel:

- Tools for identifying and correcting bad pixels (automatic or manual replacement)

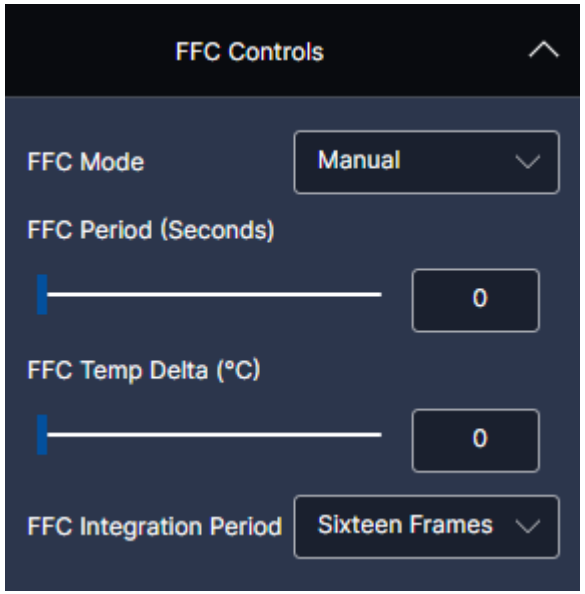
Configuration Controls:

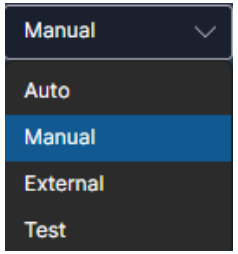
- General camera configuration options, including palette selection, telemetry, and behavior settings

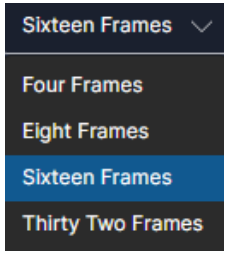
Sync & Frame Rate:

- Controls for frame timing, external sync input, and available output frame rates

3.1 FFC CONTROLS







FFC (Flat Field Correction) Mode:

- Toggle the type of FFC happening on the camera:
  - Auto: Camera performs FFC automatically based on time & temperature
  - Manual: One FFC at startup; all future FFCs must be triggered by the user
  - External: FFC must be triggered by the user/host. The correction is applied using an external blackbody instead of the internal shutter. Camera does not auto-trigger.
  - Test: Engineering/debug use only

FFC Period (Seconds):

- Max time allowed between Auto-FFCs (Auto mode only)

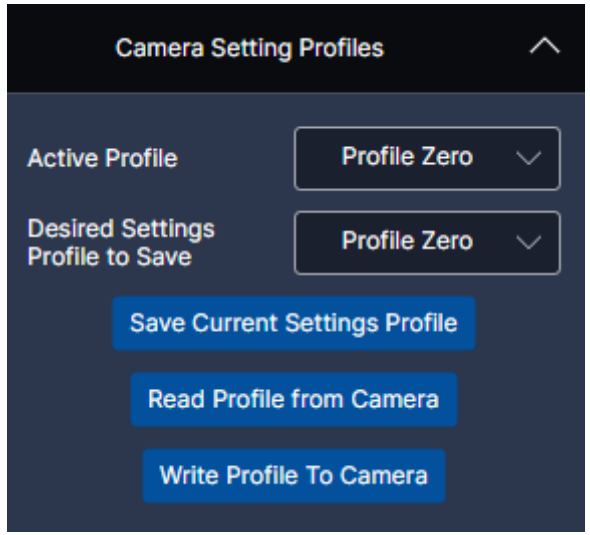
FFC Temp Delta (°C):

- Required temperature change before Auto-FFC is allowed

FFC Integration Period:

- Number of frames averaged during the FFC capture:
  - 4 Frames – Fastest
  - 8 Frames – Moderate
  - 16 Frames – Higher smoothing
  - 32 Frames – Maximum averaging

3.2 CAMERA SETTING PROFILES



Active Profile:

- Selects which saved profile the camera is currently using

Desired Settings Profile to Save:

- Chooses the slot where current settings will be stored

Save Current Settings Profile:

- Saves all current camera settings into the selected profile slot

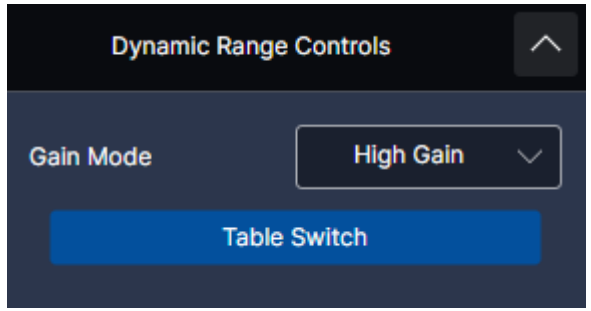
Read Profile from Camera:

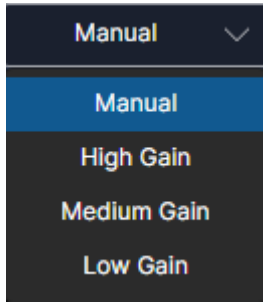
- Loads the selected profile's saved settings into the GUI

Write Profile to Camera:

- Applies the selected profile's settings to the camera

3.3 DYNAMIC RANGE CONTROLS





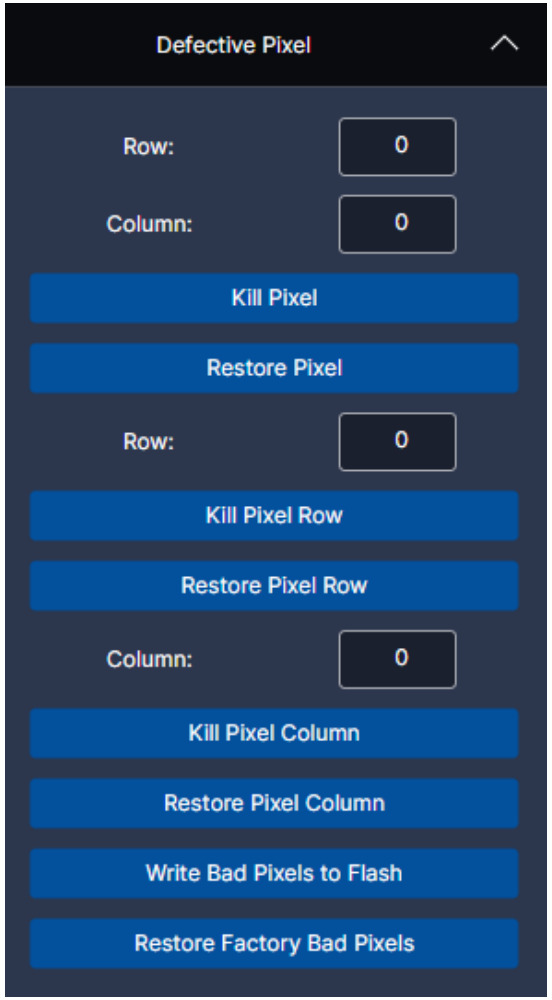
Gain Mode:

- Selects the camera's operating gain state
  - High Gain – Highest sensitivity; best for standard temperature scenes
    - Used for most cases
  - Medium Gain – Balanced range and sensitivity
  - Low Gain – Supports hotter scenes with wider temperature range
  - Manual – User controls gain state rather than automatic switching

Table Switch:

- Forces the camera to switch to the appropriate internal NUC table for the selected gain mode and temperature range

3.4 DEFECTIVE PIXEL



Kill Pixel:

- Marks a single bad pixel (Row/Column) so the camera replaces it using neighboring pixels

Restore Pixel:

- Removes the correction for that pixel and returns it to normal operation

Kill Pixel Row:

- Flags an entire row as defective and replaces it automatically

Restore Pixel Row:

- Restores the row to its original behavior

Kill Pixel Column:

- Flags an entire column as defective

Restore Pixel Column:

- Restores the column to normal operation

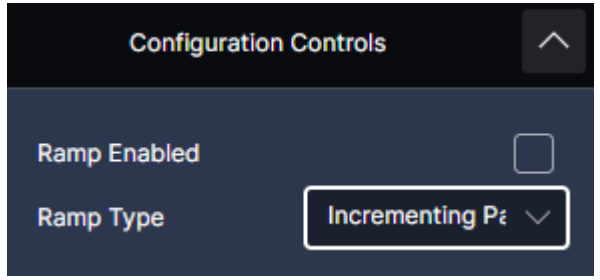
Write Bad Pixels to Flash:

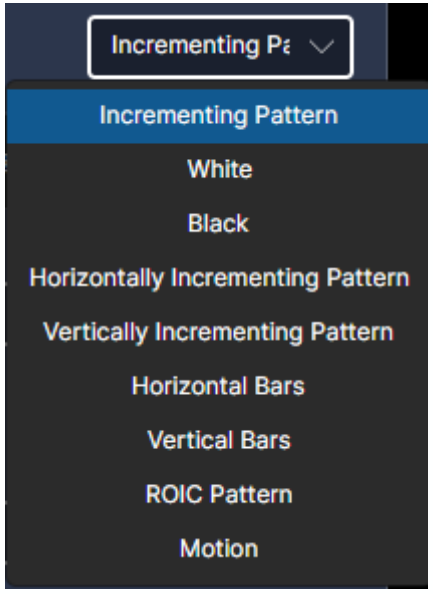
- Saves all current bad-pixel corrections to camera flash for persistent storage

Restore Factory Bad Pixels:

- Reloads the factory-defined bad-pixel map

3.5 CONFIGURATION CONTROLS





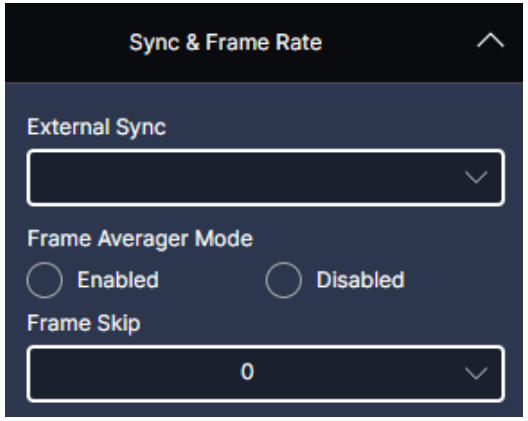
Ramp Enabled:

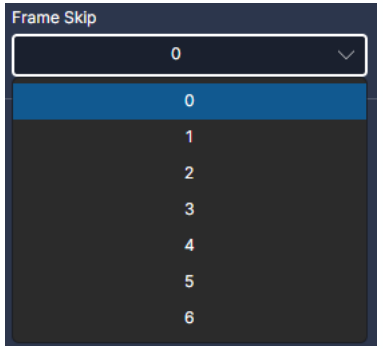
- Turns on a test-pattern output instead of the live image

Ramp Type:

- Selects the pattern displayed when Ramp is enabled:
  - Incrementing Pattern – Gradually increasing pixel values
  - White / Black – Full-white or full-black frames
  - Horizontally Incrementing Pattern – Brightness increases left → right
  - Vertically Incrementing Pattern – Brightness increases top → bottom
  - Horizontal Bars – Repeating horizontal stripe pattern
  - Vertical Bars – Repeating vertical stripe pattern
  - ROIC Pattern – Shows sensor readout blocks for diagnostic use
  - Motion – Animated pattern for pipeline verification

3.6 SYNC & FRAME RATE





External Sync:

- Disabled – Camera runs on its internal timing
- Slave – Camera syncs its frame timing to an external trigger source

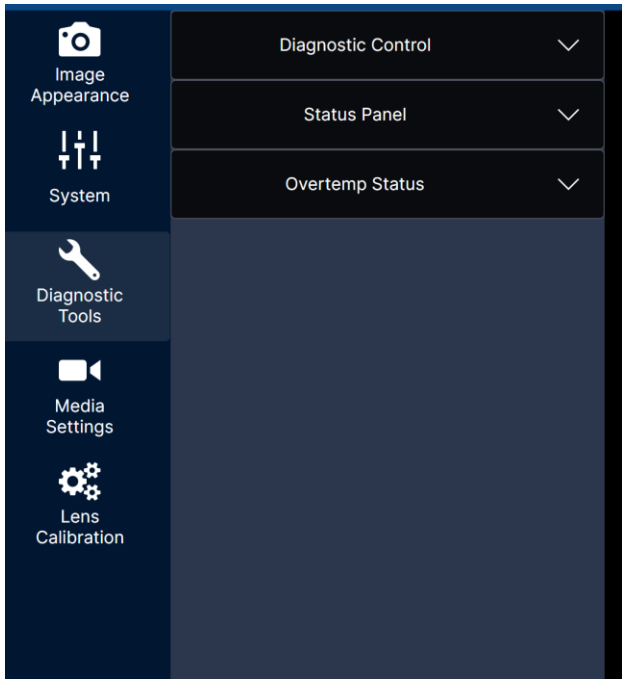
Frame Averager Mode:

- Enabled – Averages multiple frames to reduce noise (lower temporal noise)
- Disabled – Outputs each frame individually (maximum responsiveness)

Frame Skip:

- Skips a selectable number of frames to reduce output frame rate
- Options: 0–6 (0 = no skipping)

4.0 DIAGNOSTIC TOOLS



Diagnostic Control:

- Update camera software and reboot the camera

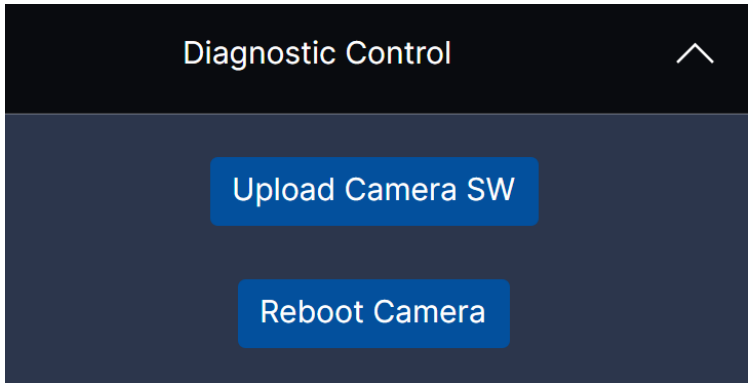
Status Panel:

- View camera temperature, software/firmware versions, and identification info

Overtemp Status:

- Monitor core temperature and any over-temperature events

4.1 DIAGNOSTIC CONTROL



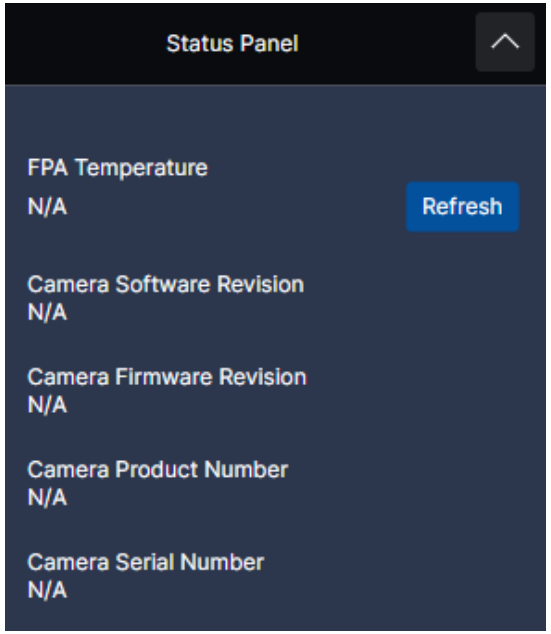
Upload Camera SW:

- Loads new camera software/firmware onto the Boson SX8

Reboot Camera:

- Restarts the camera to apply updates (such as loading new camera software) or recover from errors

4.2 STATUS PANEL



FPA Temperature:

- Shows the current focal plane array temperature in Kelvin

Camera Software Revision:

- Displays the installed software version

Camera Firmware Revision:

- Shows the firmware build running on the camera

Camera Product Number:

- Identifies the product configuration loaded on the unit

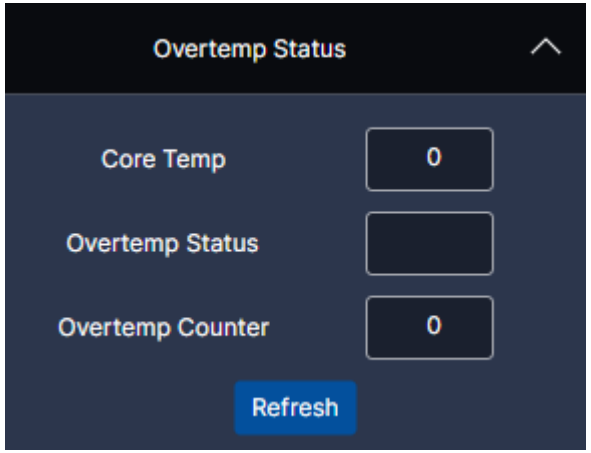
Camera Serial Number:

- Unique identifier for the specific camera

Refresh:

- Updates FPA temperature to latest value

4.3 OVERTEMP STATUS



Core Temp:

- Displays the current internal core temperature

Overtemp Status:

- Indicates whether the camera is currently in an over-temperature condition (TRUE or FALSE output displayed)

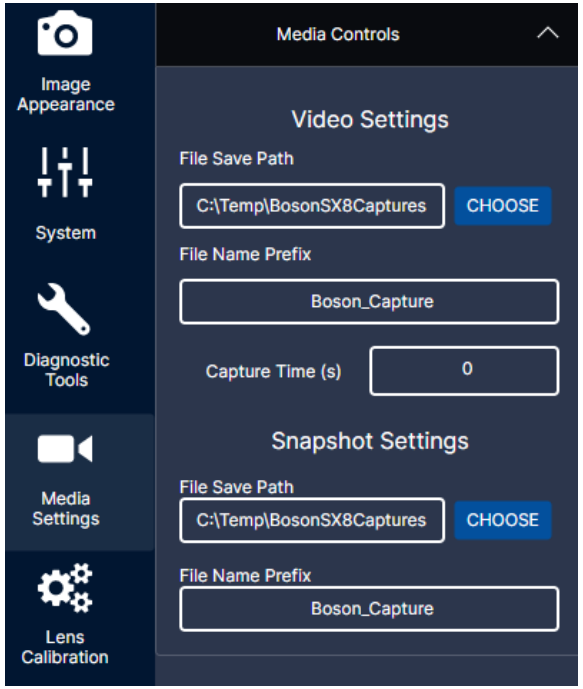
Overtemp Counter:

- Shows how many over-temperature events have occurred since power-up

Refresh:

- Updates all values with the latest temperature status

5.0 MEDIA SETTINGS



Video Settings

File Save Path:

- Choose where recorded video files will be stored

File Name Prefix:

- Sets the prefix used for all saved video filenames

Capture Time (s):

- Duration of the video capture in seconds

Snapshot Settings

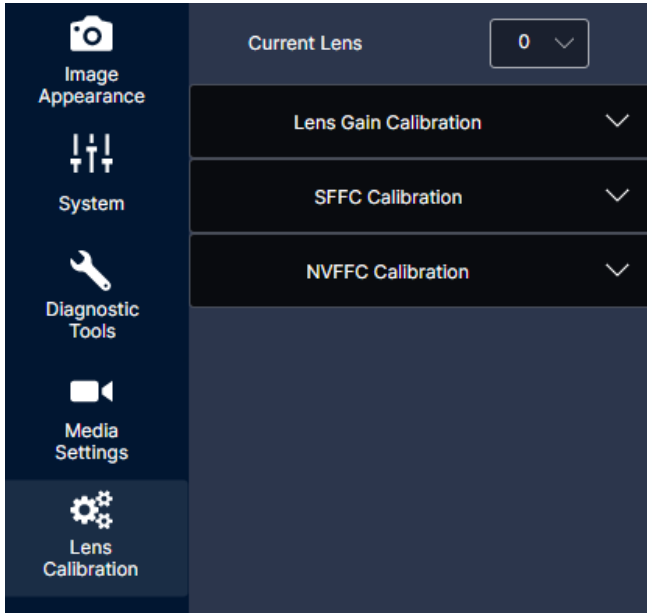
File Save Path:

- Select the folder where snapshot images will be saved

File Name Prefix:

- Sets the prefix for saved snapshot filenames

6.0 LENS CALIBRATION



Current Lens:

- Select the lens profile (0 or 1) that the camera should use for calibration and correction

Lens Gain Calibration:

- Creates a gain map tailored to the specific lens

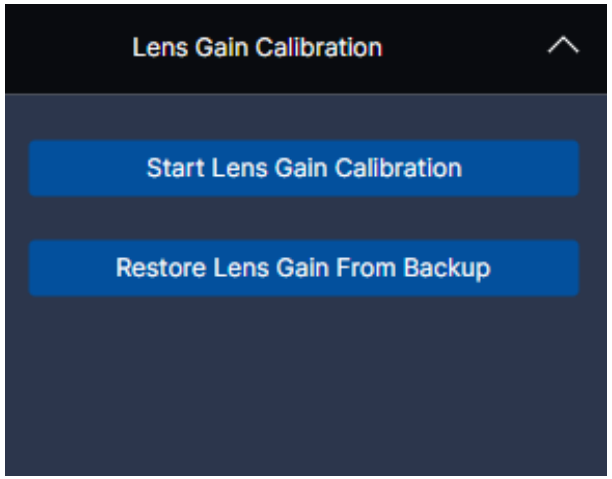
SFFC Calibration:

- Generates shutterless correction for fine non-uniformity

NVFFC Calibration:

- Saves all correction maps to flash so they persist across restarts

6.1 LENS GAIN CALIBRATION



Lens Gain Calibration:

- Creates a lens-specific gain map that compensates for optical variations introduced by the lens
- Must be performed with a uniform target, e.g., flat blackbody
- Required before running SFFC or NVFFC

Start Lens Gain Calibration:

- Begins the lens gain calibration process and generates a new gain map

Restore Lens Gain From Backup:

- Reloads a previously saved lens gain map if recalibration is not needed

6.2 SFFC CALIBRATION

SFFC Calibration (Shutterless Flat Field Correction):

- Produces a shutterless correction map to reduce residual non-uniformity that appears between mechanical FFC events
- Depends on a valid Lens Gain calibration
- Used to smooth fine drift and pixel variation over time

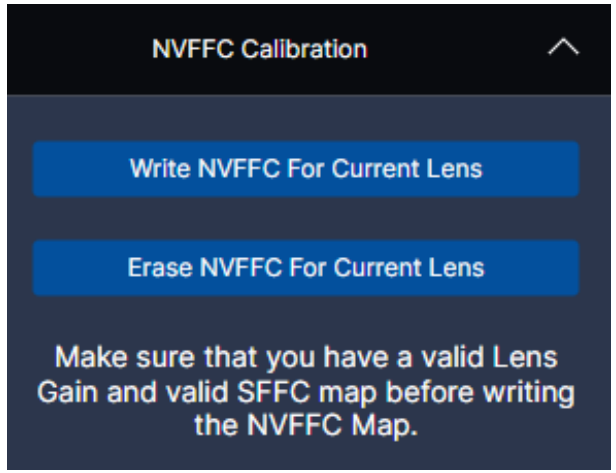
Calibrate SFFC:

- Automatically captures and generates an SFFC map

Manual SFFC Cal:

- Allows the user to manually trigger SFFC creation for more controlled workflows

6.3 NVFFC CALIBRATION



NVFFC Calibration (Non-Volatile FFC):

- Saves the combined Lens Gain + SFFC + FFC correction data into flash memory
- Ensures corrections remain intact across reboots and power cycles
- Must only be written after valid Lens Gain and SFFC calibrations.

Write NVFFC for Current Lens:

- Stores the complete correction set (Lens Gain + SFFC + FFC) to non-volatile memory

Erase NVFFC for Current Lens:

- Deletes the stored NVFFC data, returning the lens profile to default

7.0 ACRONYMS

EAR — Export Administration Regulations

GUI — Graphical User Interface

AGC — Automatic Gain Control

FFC — Flat Field Correction

SFFC — Supplemental (Shutterless) Flat Field Correction

NVFFC — Non-Volatile Flat Field Correction

NUC — Non-Uniformity Correction

FPA — Focal Plane Array

DDE — Digital Detail Enhancement

ROI — Region of Interest

ROIC — Readout Integrated Circuit

ACE — Adaptive Contrast Enhancement

RGB — Red, Green, Blue (color model)

SCNR — Suppressed Column Noise Removal

SRNR — Suppressed Row Noise Removal

8.0 INSTALLATION REQUIREMENTS

Supported Operating System	Windows 11
Minimum PC requirements	
CPU	Dual-core x64
RAM	8 GB
GPU	Any GPU supporting Direct3D 11
Storage	200 MB available space
Storage Speed	150+ MB/s
Storage Interface	USB 3.0 or NVMe
USB Driver Requirements	None

9.0 CONNECTION EXAMPLE

- Connect the Boson SX8 camera to the device running the Boson SX8 GUI
- Confirm that the camera is streaming thermal video
- View the image output and access camera controls

10.0 SUPPORT INFORMATION

Helpful Resources	
Support Portal	Submit support tickets for general inquiries
Boson SX8 Product Page	Product information, datasheets, and feature overview