

Operation

- [Project Manager](#)
- [Transient Thermoreflectance \(TR\)](#)
- [Movie Mode \(TR and IR\)](#)
- [FA Mode \(TR and IR\)](#)
- [Calibration — Quick Start](#)
- [SanjANALYZER™ — Thermal Image Analyzer](#)
- [Output Module](#)
- [Operating SanjVIEW 7 with the Visible Camera \(TR\)](#)
- [Device Biasing, Trigger Function, and Timing](#)
- [SanjVIEW 7 for Near Infrared \(NIR\) Camera](#)
- [SanjVIEW 7 for Infrared \(IR\) Camera](#)

Project Manager

Project Manager

Launch SanjVIEW from the Windows 10 start screen shortcut; once the license verifies, the Project Manager window opens. From here you can select:

- **Transient Thermoreflectance** (TR only): acquires transient thermal images for pulses between 50 μ s and 5 ms. Available only with the Visible Camera.
- **Movie Mode**: acquires quasi-steady-state thermal images for pulses longer than 5 ms.
- **FA Mode**: simplified quick-analysis mode for fault localization.
- **SanjANALYZER**: performs advanced analysis on previously acquired data.

Key features of the Project Manager window:

- **Operation Select Buttons** — single-click to open Transient Thermoreflectance, Movie Mode, FA Mode, or SanjANALYZER.
- **System Status** — indicator lights show communication status per instrument (green = communicating; off/white = not communicating).
- **LED Brightness** (TR only) — check "Auto" to let the computer self-adjust image brightness.
- **Camera Selection** — choose between the turret-mounted Infrared (IR) camera and the Visible or Near-IR camera. Use the **F1** hotkey to switch quickly.
- **Workspace Path Selection** — File → Options → Software, to set the workspace file path used across SanjVIEW modules.
- **Image Intensity Graphs** — average image intensity plus a histogram option, to help keep pixels below saturation.
- **Image Display Window** — shows the live camera stream; brightness/light source controlled by the Illumination Controls.

Beginning thermal imaging on a new device:

1. Place the device under test (DUT) on the probe station.
2. In Project Manager, confirm all components show a green status light (unless the NIR camera is unavailable).
3. Select the desired illumination option and "Channel Number," and focus the microscope. A live DUT image appears on the right of the screen.
4. Check the "Auto" box under LED Brightness for automatic brightness optimization (Visible Camera only).

Note: When imaging with infrared light (IR), Transient Thermoreflectance options are unavailable, and LED illumination is disabled during an IR imaging session.

Viewing temperature response in DC mode: while Project Manager is running, approximate temperature values display on the camera measurement window, scrolling as an average of the drawn Region of Interest (ROI) (or the whole image if no ROI is drawn). Use the rectangle tool to draw an ROI. DUT bias controls let you select outputs and voltage while acquiring images; the TC-100 stage can be used (~ 100 mA/V), or the Relay output can be selected from the pulldown. Select the TC-100 tab and press "TC-100 State on" to read the thermocouple value (useful for setting IR camera gain). Right-click the image window to save the acquired image and its color palette.

[diagram/image in source – not reproduced here: Figures 1–3, Project Manager and DC mode window screenshots]

Transient Thermoreflectance (TR)

Transient Thermoreflectance (TR)

Acquires new thermal imaging data for pulses between 50 μ s and 5 ms (transient).

Key features:

- **Mode Selector** — Device Setup (optimize brightness/focus, no thermal image shown) vs. Thermal Imaging (begin acquisition).
- **Camera Image Display** — live DUT image; zoom tool (SHIFT-CLICK to zoom out).
- **Output Voltage Control** — voltage to device and output source.
- **Illumination Control** — LED pulse width (image integration time for a thermal event); adjust acquisition period (total cycles per image) if brightness is off.
- **Time Delay Control & Timing Parameters** — controls when in the heating cycle the "snapshot" image is taken.
- **Thermal Image Display** — calculated thermal image using the entered thermoreflectance coefficient; scale bars compress the scale to see detail despite shadows.
- **Region Mean Graph** — history of measured ROIs; ideally points differ by less than 5% before stopping. Right-click → "clear chart" to reset.
- **ROI Statistics:**
 - Temperature Value — ROI ΔT for the current image.
 - CTR — the thermoreflectance coefficient, constant per substance; must be entered correctly and must correspond to the active Channel Number (wavelength). Example values given in the source: Channel 6 (530 nm) CTR = 2.5E-4; Channel 6 (470 nm) CTR = 1.6E-4 (*source lists both as "Channel 6" — verify wavelength/channel mapping before relying on this*). CTR may also be called "Cth."
 - Scale Bars — zoom the temperature scale; note the ROI mean tool may be inexact when limit bars coerce data into range.
 - ROI Tools — rectangle, annulus (zoom/magnification), freehand region, point tool.

Example procedure — obtaining a transient measurement:

1. Turn off "Int Vo 20mA Range" in the Project Manager.
2. Set "DUT Pulse" to the desired pulse width (example: 500 μ s).
3. Set "Voltage to Device" (example: 6.0 V) and select "Update Values."
 1. Switch to "Thermal Imaging" mode.
 2. Confirm the device is heating as expected for the 500 μ s delay.
4. Set "Image Delay(s)" to 0 to initialize delay to 0 μ s (you can start at any initial delay time).
5. Go to File → Setup Sweep.
6. Enter "Number Delay Images" (example: 51).
7. Enter "Delay Steps(s)" (example: 10.0 μ s) — software will take 51 images at 10 μ s steps starting at 0 s (0–500 μ s).
8. Enter "Ave time per frame(s)" (example: 5 s per image).
9. Enter the "Base File Name" to save under.
10. Select an ROI with the "Draw ROI" tool.
11. Press "Start."
12. The software steps through the thermal transient automatically and shuts off voltage on completion. A thermal image is averaged and saved at the configured interval (example: every 5 s; 255 s total for 51 points, 4 min 15 s).
13. Once done, exit and open the saved data in SanjANALYZER.

The transient response of an ROI can be watched live in the "Region Mean Graph" tab (lower-left) by selecting a region with "Draw ROI."

Movie Mode (TR and IR)

Movie Mode (TR and IR)

Acquires quasi-steady-state thermal images for pulses longer than 5 ms. Used to view longer-timescale IR and TR waveforms. In TR mode, SNR may be reduced relative to Transient/FA modes — localize thermal events first, then use Movie Mode for further study.

Key features:

- **Camera Image Display** — Zoom, Grab, and ROI selector tools (SHIFT+CLICK to zoom out).
- **Time Domain & Frequency Domain Graphs** — average of ROI pixels over time or frequency; sweep with the frame number control.
- **Device Controls** — the EZ500A SanjCONTROLLER drives two outputs: Voltage Out (Output 1, primary, modulated in sync with the camera) and Output 2 (constant source for powering other circuit parts). Changes apply on "Update Values." Pulse timing duration is adjustable.
- **Waveforms Graph** — shows output voltage/current when "Controller Box" is the selected output source.
- **Thermal Image Display** — shown in relative units ($1e-4$ dR/R) or temperature (via CTR). Draw an ROI in Thermal Imaging mode to see the averaged temperature value.
- **Region Temperature:**
 - ΔT ($^{\circ}\text{C}$) — up to 5 different ROIs.
 - CTR or E — thermorefectance coefficient (material-dependent) or, for IR sessions, Emissivity (E).
 - Scale Bars — active when Autoscale is off; palette selector for visualization; binning modes 2X and 4X improve SNR.
 - ROI Tools — rectangle, annulus, freehand, point.
- **Save Data** — choose file name/path; comment text box appears when the file is reopened in the Thermal Image Analyzer.

Setting the time window: Options → Software tab → "Movie Mode Length" dropdown; sets the averaging time window to 3–30 seconds.

Example procedure — obtaining a Movie Mode image:

1. Connect the DUT to Voltage Out (AUX Output optional).
2. Select biasing conditions via the "Device Control" panel and click "Update Values."

3. While the image averages, use the ROI tool, scale bars, and Thermal Image Display tool to optimize the image.
4. Once the desired thermal image is achieved, save a data file for further analysis and output.

FA Mode (TR and IR)

FA Mode (TR and IR)

A simplified differential-imaging mode for quick fault localization.

Key features:

- **Camera Image Display** — grab (hand), zoom (magnifier, SHIFT-CLICK to zoom out), and area select (square, used with the merged image to crop to ROI) tools.
- **Output Voltage Control** — device voltage and output source.
- **Camera Histogram** — brightness, set previously in Project Manager.
- **Thermal Image Display** — calculated thermal image; scale bars compress the scale.
- **ROI Statistics** — Temperature Value (ΔT); CTR or E (material coefficient, user-entered); Scale Bars; ROI Tools (rectangle, annulus, freehand, point).
- **Region Mean Graph** — history of measured ROIs; ideally within 5% before stopping; right-click "clear chart" to reset.

Calibration — Quick Start

Calibration — Quick Start

Calculates the thermorefectance coefficient (TR) or emissivity (IR) of specific device surfaces. Accurate temperature readings depend on a coefficient obtained via calibration. Coefficient maps can be produced for point-by-point calibration. The module thermally cycles the DUT while reading the thermocouple back, continuously averaging coefficients across cycles to raise SNR.

Key features:

- **Camera Image Display** — grab, zoom (SHIFT-CLICK to zoom out), and area select tools.
- **Hardware** — Thermal Chuck Settings (current to TCAT-100 stage, changeable via Options in Project Manager); Microscope Settings (objective magnification, set in Project Manager).
- **Timing/Illumination** — Thermal Time Constant (hot-cycle duration); Image Averaging (#/cycle).
- **Brightness** — adjust for a bright-but-not-saturated image (saturation at 4095 units); Auto Brightness available; "Good Illumination" indicator turns green when illumination is sufficient for good SNR.
- **3D Alignment (TR only)** — Image Auto Alignment detects and corrects image shift during a run (reduces edge effects). Alignment Reference sub-controls: Focus ROI (region to track — pick an area easy to detect a shift in, e.g. a corner), Capture Reference (reference image to shift back to), Focus Tolerance (in-focus threshold on slope), Alignment % (increase to improve accuracy), Vibration Filter (decrease to improve accuracy).
- **Thermal Image Display** — main C^{tr} image; C^{tr} of all materials present is calculated and shown.
- **System Status / TCAT Image Parameters** — chosen measurement parameters, elapsed cycle time, heating/cooling status.
- **C^{tr} or Emissivity Graphs** — Camera Data (intensity, should not vary significantly during measurement, shows hot/cold-cycle transitions); Temperature (thermocouple readout, tracks hot/cold cycle); ROI History (C^{tr} history for a specific ROI, to check stability across cycles); ROI histogram (C^{tr} distribution across all pixels in the ROI, for consistency checking).
- **Area Statistics** — C^{tr}/Emissivity and associated data (incl. thermocouple temperature) for the selected ROI.
- **Save Image** — file name/path; comment text box shown when reopened in the Thermal Image Analyzer.

Verifying calibration using TCAT-100 in pulsed mode: set up a test sample as for calibration, launch Pulsed Mode software, select TCAT-100 as the output device, and enable thermocouple readback to simultaneously display the thermocouple signal alongside TR or IR measurement data. Calibrated IR camera results should closely overlap thermocouple results. Note: the thermocouple used with the TCAT module has a response time of ~ 0.5 s, so it may be necessary to lengthen the timescale to see an accurate response.

SanjANALYZER™ — Thermal Image Analyzer

SanjANALYZER™ — Thermal Image Analyzer

A fully integrated analysis package for low-frequency and transient thermal imaging data.
Capabilities:

- View previously acquired thermal images
- Correct for thermorefectance coefficients
- Utilize point-by-point calibration maps
- Find area mean temperature values
- Create and save cross-section plots
- Output images in various formats
- Create .avi movies from an image series (SanjANALYZER Plus only)

Key features:

- **Load a Thermal Image** — low-frequency data uses `.fdi`; transient data uses `.tti`.
Double-click a file in the file selection control to load the CCD and thermal images.
- **CCD Image Display** — grab, zoom (SHIFT-CLICK to zoom out), area select tools.
- **Primary Thermal Image Display** — viewing modes: Thermal Image VIEW, Merge VIEW, and optional 3D VIEW (SanjANALYZER PLUS).
 - **Thermal Image VIEW** — calculation using masking info or a single coefficient. ROI Mean/Statistics: select a shape or freehand region for mean temperature (selection also shows on the CCD image). Cross-Section Graph: draw a line to plot temperature vs. distance (masked/invalid points excluded); select the correct Objective for accurate scale; save in ASCII (tab-delimited). Limit Bars: coerce auto-scaled data to selected limits (also affects Merge and 3D views). Color Palette Selection: multiple palettes, saved with exported images. Software Binning (x2 or x4): spatial averaging to improve faint images or cross-section SNR, at the cost of spatial resolution.
 - **Merge VIEW** — for display/saving only (temperature values live only in the thermal image). Converts to RGB for compatibility with image output formats.
CCD/Thermal/Thermal Image slide bars: first slider overlays % of CCD image on the

thermal image (to locate hotspots precisely); gain/offset sliders apply to the thermal image (100%/0% = unchanged).

- **Crop from CCD Image checkbox** — crop the thermal image away from the ROI, useful for reducing .avi movie file size.
- **Fix Temperature Scale checkbox** — keeps a previously set scale fixed across a loaded series (recommended workflow: find the hottest image in the series, set the desired scale, check "fix scale," return to the first image, and run "process series").
- **Show Voltage / Delay / Color bar checkboxes** — overlay acquisition conditions and the color-to-temperature mapping on the image.

Example procedure — analyzing a transient thermorefectance image series:

1. Select the first image of the transient series.
2. Enter the "number of images in the series" (example: 51).
3. Select an ROI box on the area of interest (example: a 5 μm gold heater).
4. Select "Process Series." The software steps through the series and plots data in "ROI Mean Series" (bottom left); right-click the y-axis to autoscale.

Output Module

Output Module

See the Output Module Signal Reference table in Specifications for pin functions (VI EXT, VO EXT, AUX INT, VO INT, VO INT 20mA Range, TRIG).

Operating SanjVIEW 7 with the Visible Camera (TR)

Operating SanjVIEW 7 with the Visible Camera (TR)

Opening and initial setup:

1. Open SanjVIEW v7.0 from the Computer desktop.
2. Center the sample in Project Manager and focus on the desired device.
3. Confirm all indicator lights are green for your connected system.
4. Select the camera to use (Infrared / Visible-Thermoreflectance / Near-Infrared). Press **F1** to switch cameras.
5. Click the Auto Focus tab.
6. Set "Mag" to your objective (example: 5X).
7. Click "Enable Motion" ON and "Center Stage" ON. (Note: the microscope may need refocusing after centering the stage.)
8. Click the file icon; name your file path and click "current folder."
9. Select the desired imaging operation.

Note: Transient Thermoreflectance is not available with an Infrared camera selected — it requires the Visible camera.

Steady State:

Hardware:

1. Enter the desired Base Temp (°C) and click "SET" next to Set Base Temp.
2. Set Stage State "ON."
3. Set "Vo ON Voltage" to 7V.

Timing/Illumination:

1. Set Device On Time to 10.
2. Set Image Averages (#/cycle) to 10.

3D Alignment — Focus ROI:

1. Select a region on the CCD image with the rectangle tool (choose a unique feature, e.g. an edge or scratch mark).
2. Press "Focus ROI" to set the selected region as your ROI.
3. Wait until the Focus ROI light turns green. (Zoom: hold SHIFT to zoom out, SHIFT+CLICK to zoom in.)
4. Confirm "Enable 3D NanoAlign" is checked; check it if not.

3D Alignment — Capture Reference:

1. After the ROI focuses, press "Capture Reference" to set the reference region.
2. Wait for the Capture Ref light to turn green ("Enable Digital Anti-vibration" turns on automatically).
3. Set initial Focus Tolerance, Alignment %, and Vibration Filter parameters — lights turn green when in range. (Increasing Alignment % and decreasing Vibration Filter improves alignment accuracy. Alternatively, load a prior reference.)

Start Measurement:

1. Click "START Measurement."
2. Progress shows in the System Status bar ("Turn OFF" after each cycle) with a "Loop Iterations" count. For TR, 9–11 loop iterations is sufficient.
3. Under Save Path, confirm the directory/name (example: `C:\Data\Qualification\`); append a filename.
4. Click "Save Every Cycle," then click "Save Data" when ready. (Save the image before stopping the measurement.)
5. To stop: click "STOP MEASUREMENT," then "Return to Project Manager," or File → Quit.

Calibration:

Hardware:

1. Set "Magnification" to match the objective (example: 5x).
2. Set "High Temp" to 120 °C and "Base Temp" to 20 °C.
3. Turn "Stage State" ON.
4. Click "Set Low Temp" to initialize the chuck to the base temperature.
5. Click "Use Chuck Sensor" to use the embedded chuck thermal sensor for calibration (off = use an external thermal probe).

Timing/Illumination:

1. Set Stage Heating Time to 40.
2. Set Image Averages to 50.

3D Alignment — Focus ROI / Capture Reference: same procedure as Steady State above.

Start Measurement:

1. Click "START Measurement." The system cycles through temperatures, showing "Calibration Done" after each cycle and a Loop Iterations count.
2. Select the region on Thermal Image View to view the Calibration Factor (shown in "Mean CTR").
3. Under Save Path, confirm directory/name (example: `C:\Data\Qualification\Training`).
4. Check "Save Every Cycle," then click "Save Data." (Save before stopping.)
5. Stop via "STOP MEASUREMENT," "Return to Project Manager," or File → Quit.

Failure Analysis (FA) Mode:

Parameter Setup:

1. In Project Manager, change "Cam Selection (F1)" to "VISIBLE."
2. Uncheck "INT Vo 20mA Range" (green = checked, grey = unchecked).
3. File → Options to open a new window.
4. Software tab → set "FA Mode Pulse Width" to Long (15 Frames).
5. Return to Project Manager, click "FA Mode" to open the FA Mode window.

Process: (confirms the device is biased and current is flowing, before using Movie or Transient mode)

1. Go to the "Biasing" tab.
2. Change Vo(V) to 7.000.
3. Click "Update Values" to apply voltages.
4. Check that "Peak Voltage (V)" and "Peak Current (I)" read near 7V and 70 mA for device 2 (Center Diode). (If current is much lower than expected, confirm "INT VO 20mA Range" is unchecked in Project Manager.)

Save Data:

1. File → Save Data.
2. Click File Browser, select the target folder, click "Current Folder" (example: `C:\Data\Qualification\Training`).
3. Enter the desired file name (example: "FA-File").
4. Click "Save."
5. Click "Return" to exit the Save Microsanj Data pop-up. (Remember to update the Microsanj Data Save Path before a new dataset, to avoid overwriting prior data.)

Transient Thermoreflectance:

System Status:

1. Change camera to VISIBLE.
2. Click "Transient Thermoreflectance."
3. Click the "Measurement Settings" tab.

Measurement Setting (alignment — two approaches):

First approach (Focus Region + Capture Reference):

1. Select a region on the CCD image with the rectangle tool (unique feature, e.g. edge/scratch).
2. Press "Focus ROI"; wait for the Focus ROI light to turn green.
3. Press "Capture Reference"; wait for the Capture Ref light to turn green.

Second approach (Load Reference):

1. Click "Load Reference."
2. Enter the calibration file path (browse icon), then click "LOAD."
3. Wait for the "Load Reference" light to turn green.
4. Click "Enable 3D Motion" and "Enable DAV."
5. Set "Alignment %" to 99.00.

Transient Thermoreflectance — single image: (thermal image should appear before proceeding)

1. In Measurement Settings, set "Voltage to Device (V)" to 7V.
2. Click "Update Values" to apply voltages.
3. Review the auto-populated "DUT Pulse," "LED width," and "Acq Period" values (changeable, but left as-is in this example).
4. Click "Start Measurement."
5. Wait ~30 s or until noise averages out, then File → Save Data.
6. Click File Browser, choose the save location, enter a file name, click "Save."
7. Click "Measurement Running" to stop.

Transient Thermoreflectance — series:

1. Set "Voltage to Device (V)" to 7V.
2. Click "Update Values."
3. Review auto-populated "DUT Pulse," "LED width," "Acq Period" (changeable).
4. Set "Image Delay" to 0s; click "Update Delay."
5. Go to File → Setup Sweep.
6. Click File Browser, choose the save location ("current folder"); append the desired file name.
7. Enter "Number Delay Images" (example: 10).
8. Enter "Delay Step" (example: 50 μ s — the DUT Pulse increment per frame).
9. Enter "Ave time per frame" (example: 30 s).
10. Click "START" to begin thermal imaging and data collection.
11. When the designated number of images has been collected, the "start" button turns green again; click "close" to exit the dialog, then click "measurement running" to stop the process.

SanjAnalyzer (Visible camera path):

System Status:

1. Confirm camera is set to VISIBLE.
2. Click "SanjAnalyzer" to open the "SanjVIEW Image Analyzer" window.

Process Data:

1. Select the "Calibration" tab.
2. Select "Point to Point" under the "Method" dropdown (opens a "Load CTR Map" window).
3. Click the Browse icon and select the calibration image.
4. Click "LOAD" to overlay the calibration image onto your selected test image.
5. In the file window (top left), click the Browse icon and double-click the file to analyze. (If the file is not listed, update the directory with "UP Dir.")
6. Drag an ROI box across the specimen with the rectangle tool to measure temperatures (up to 5 ROI boxes; hold Ctrl to select additional boxes).
7. Adjust temperature scale and image averaging factors as desired (optional).
8. Select the "Settings" tab, choose a save path (Browse icon), and click "Save Image Current View."
9. To process a series: enter the number of files into "Number of Images in Series" and click "Process Series." The ROI Mean graph plots mean temperature of the selected ROIs over time. (Right-click the graph → Export → "Export Data to Clipboard" to export the data to a table.)

Device Biasing, Trigger Function, and Timing

Device Biasing, Trigger Function, and Timing

See the Device Biasing / Trigger Connectors table (Specifications) for the SanjCONTROLLER PLUS™ connector functions (VI EXT, VO EXT, AUX INT, VO INT, TRIG).

[diagram/image in source – not reproduced here: Section 9.2–9.8 – timing sequence diagrams for transient analysis, internal biasing, external DC supply, triggering an external source, Slave Mode (TRIG IN, Movie Mode only), transient timing signal, and transient software with light emission]

SanjVIEW 7 for Near Infrared (NIR) Camera

SanjVIEW 7 for Near Infrared (NIR) Camera

SanjVIEW 7 provides the same functionality for Visible and NIR cameras, provided the camera selection (F1: VISIBLE/NIR) is compatible with the LED selection (F3). See the Camera/LED Compatibility table in Specifications.

SanjVIEW 7 for Infrared (IR) Camera

SanjVIEW 7 for Infrared (IR) Camera

Opening and initial setup:

1. Open SanjVIEW v7.0 from the Computer desktop.
2. Center the sample in Project Manager and focus on the desired device.

System Status:

1. Confirm all indicator lights are green for your connected system.
2. Select the camera to use, then uncheck "INT Vo 20mA Range" to bypass the 20 mA current limit.
3. Click "Temp Control" tab; toggle ON/OFF and view readings for Stage, Thermal Coupler (TC), and ROI. Set Point to 75, then click "Stage State" to turn on the stage.
4. Click "Auto Focus" tab; select objective magnification (example: 5X).
5. Click "Center Stage" ON to center the Piezo controller or other external autofocus controller (only if applicable). (Note: the microscope may need refocusing after centering.)
6. Click the file browser icon, choose the save folder, click "Current Folder."
7. Select the desired imaging operation.

Note: Transient Thermoreflectance is not available while using an Infrared camera.

Steady State: (Project Manager → "Steady State")

Hardware:

1. Enter the desired Base Temp (°C) (example: 75) and click "SET" next to Set Base Temp.
2. Turn Stage State "ON."
3. Set "Vo ON Voltage" to 10V.

Timing/Illumination:

1. Set Device On Time to 10.
2. Set Image Averages (#cycle) to 10.

3D Alignment — Focus ROI / Capture Reference: same procedure as the Visible-camera Steady State workflow above.

Start Measurement:

1. Click "START Measurement."
2. Progress shows in the System Status bar ("Turn OFF" after each cycle) with a Loop Iterations count. (If red indicator lights appear in System Status, adjust the Alignment Reference.)
3. Under Save Path, confirm directory/name; add a filename prefix (example: `C:\Data\Qualification\SS`, prefix "SS").
4. Click "Save Every Cycle," then "Save Data" when ready. (Save before stopping.)
5. Stop via "STOP MEASUREMENT," then "Return to Project Manager," or File → Quit.

Calibration: (Project Manager → "Calibration")

Hardware:

1. Set "Magnification" to match the objective (example: 5x).
2. Set "High Temp" to 120 °C and "Base Temp" to 75 °C.
3. Turn "Stage State" ON.
4. Click "Set Low Temp" to initialize the chuck to the base temperature.
5. Click "Use Chuck Sensor" to use the embedded sensor (off = external thermal probe).

Timing/Illumination:

1. Set Stage Heating Time to 40.
2. Set Image Averages (#cycle) to 50.

3D Alignment — Focus ROI / Capture Reference: same procedure as above.

Start Measurement:

1. Click "START Measurement." The system cycles through temperatures, showing "Calibration Done" after each cycle and a Loop Iterations count.
2. Select the region on Thermal Image View to get the Calibration Factor (shown in "Cal Fact").
3. Under Save Path, confirm directory/name (example: `C:\Data\Qualification\CAL`, prefix "CAL").
4. Click "Save Every Cycle," then "Save Data." (Save before stopping. If the thermal image is blurry, adjust Alignment Reference.)
5. Stop via "STOP MEASUREMENT," "Return to Project Manager," or File → Quit.

Movie Mode: (Project Manager → "Movie Mode")

Control Settings:

1. Set "Voltage Out" to 10V.
2. Click "Update V" to apply voltages.
3. Set "DUT Pulse (s)" (example: 1s); click "Update Timing."
4. Confirm "Save Whole Series" is on (default).
5. Click the "File Path" icon or type the desired path; select a name.
6. Click "Start Movie" on the "EZ500 Movie Mode Acquisition" panel.
7. Click "Save Image." (Note: Movie Mode saves a series of 105 files per cycle when you click "Save Image.")
8. To stop: click "Start Movie" to stop, then File → Exit.

SanjAnalyzer (IR path):

System Status:

1. Confirm camera is set to INFRARED.
2. Click "SanjAnalyzer" to open the "SanjVIEW Image Analyzer" window.

Process Data: same workflow as the Visible-camera SanjAnalyzer procedure above (Calibration tab → Point to Point method → load CTR map → select analysis file → draw ROI box(es) → adjust scale/averaging → Settings tab → save/process series).