

ViTiny UM for Windows V0.11

Complete User Manual

USB microscope imaging, processing, measurement and workspace reference

Software version V0.11

Manual edition 2026-09-06

MicroLinks Technology Co., Ltd. | ViTiny

Item	Edition
Software	ViTiny UM Windows V0.11 / assembly 0.11.0.0
Manual	2026-09-06 / public user functions
Language	English

How to use this manual

This manual describes the public Windows V0.11 user interface and practical workflows. Exact on-screen control labels are shown in English so they can be matched directly to the application.

> **Note** Figures 1–9 are connected-device screenshots from ViTiny UM V0.10, captured on 2026-08-19. They illustrate the workspace; V0.11 operations are described in the updated text. CAM no longer has OPEN: use FILE > LOAD. Camera name, resolution, focus, FOV, COM port and measurement values are examples.

> **Important** Available camera formats, motor focus, Full AF, LED control, reference scale and automatic EDF depend on the connected microscope model, firmware and USB controller.

Before you start — product, installation and connection

System and connection requirements

Item	Requirement
Software	ViTiny UM V0.11 for Windows
Operating system	Windows 10 build 19041 or later; use the supplied Windows x64 package
Camera	USB Video Class (UVC) microscope or camera
Controller	Optional compatible ViTiny UM focus/LED controller, typically a separate CP2102 serial function
USB	Direct USB connection or a sufficiently powered USB hub
Storage	A writable destination for images, video, measurement exports, calibration patterns and VIX workspaces

Install and open the application

1. Close an older UM Viewer or any camera application that may already own the microscope.
2. Run ViTiny-UM-Setup-V0.11-x64.exe. For a portable deployment, extract the complete ViTiny-UM-V0.11-win-x64.zip package and start ViTiny.UM.exe.
3. If Windows displays a security warning, continue only when the package source and file identity are trusted.
4. Connect the microscope and wait for Windows to finish identifying its USB functions.
5. Open ViTiny UM. Startup attempts LIVE with an available suitable UVC camera. If necessary, open CAM, select the camera and choose LIVE; use TEST ALL explicitly to verify additional modes.
6. If motor focus or LED control is required, open CTRL and confirm that a compatible controller is detected separately from the live UVC image.

Understand UVC image and controller functions separately

Component	What it provides	Evidence of success
UVC camera	Live image, format, resolution, frame rate and camera IQ controls	The image updates continuously and CAM shows the selected source/mode
ViTiny controller	Heartbeat, focus position, AF/F-AF, Z motor, STOP, LED level and mode	CTRL reports a connected controller and updates status

Contents

- Before you start — product, installation and connection
- 1. Quick Start
- 2. Workspace and Main Controls
- 3. CAM — USB/UVC Camera
- 4. AIP — Advanced Image Processing
- 5. IMAGE — ROI, Display, PIP and Recognition
- 6. MULTI — Multi-Image Processing
- 7. AUTO — Automatic Geometry
- 8. MEAS — Calibration and Measurement
- 9. FILE — Images, Video and Calibration Pattern
- 10. CTRL and VIX
- 11. Mouse, Touch and Display
- 12. Troubleshooting
- 13. Safety, Privacy and Disclaimer
- 14. Product, Copyright and Open Source
- Appendix A — Standard operating procedures
- Appendix B — Quick command reference
- Appendix C — Files, outputs and support
- Appendix D — V0.11 calibration marker diameters

> **Note** Functional content: ViTiny UM V0.11 built-in Help and verified Windows source. Layout reference: ViTiny USB Microscope Android v1.09 user manual.

1. Quick Start

1) Connect the USB microscope directly to the computer or to a powered USB hub. Wait until Windows finishes identifying the device.
2) Open CAM, select the camera, then choose LIVE. Select only a format, resolution and frame rate that has been verified for that exact camera. The first live frame is fitted automatically.
3) Mouse: roll the wheel forward to zoom in and backward to zoom out. Press and hold the middle mouse button (the wheel) while dragging to Pan the image.
4) Use AF or Z− / Z+ with a compatible ViTiny UM microscope. Use IMAGE and AIP to improve viewing. Use MEAS only after calibration when real units are required.
5) Use FILE for RAW, PHOTO, SCREEN, SAVE ALL, REC, LOAD, LIVE or CAL PATTERN. Use the separate VIX SAVE and VIX READ main icons to write or restore a workspace.

Short Hints appear when a function or icon is opened. Use Hint display at the top of Help to select Off, 1 second, 3 seconds or Permanent; the default is 1 second. A Permanent Hint remains visible until you close it. Changing the Help language also changes later Hints immediately. Closing Help does not clear Live, measurements, calibration or VIX state.

2. Workspace and Main Controls

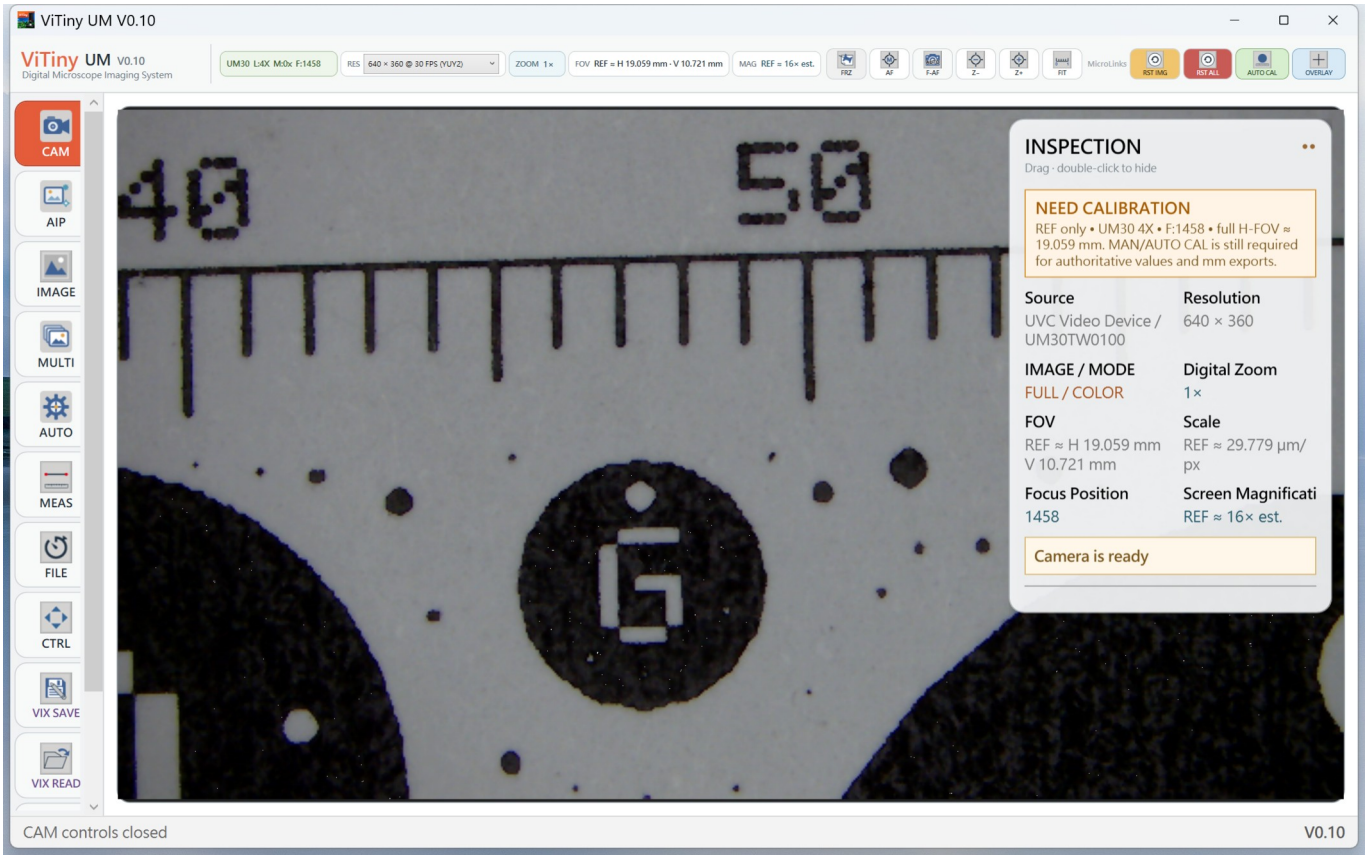


Figure 1. Main workspace and live microscope image

Actual connected-device example captured on 2026-08-19. Values vary by device and setup.

The left rail is ordered CAM → AIP → IMAGE → MULTI → AUTO → MEAS → FILE → CTRL → VIX SAVE → VIX READ → HELP → EXIT. Only one subfunction panel is shown at a time; switching panels hides controls but keeps active processing, calibration, measurement objects and results. Minimizing the window or losing focus also preserves the session.

A selected main icon uses the selected colour. A red icon means that the module still contains a non-default setting, active process or retained result even after another panel is opened. Use the module's OFF, CLEAR or RESET command to return it to the initial state.

The top bar shows microscope status, resolution/FPS, Digital Zoom, FOV and estimated screen magnification. The top bar includes FRZ, AF, F-AF, Z−, Z+, FIT, RST IMG and RST ALL. RST IMG clears AIP and IMAGE processing while preserving the current source, measurements, DRAW/TEXT annotations and calibration.

RST ALL (RESET ALL) clears processing, measurements, DRAW/TEXT annotations, calibration and loaded image/video or VIX previews, and finishes any recording. It returns to CAM and attempts LIVE when an eligible USB UVC camera is available. A matching healthy connection is reused without a USB restart. Existing sessions retain their resolution; a fresh connection uses the normal startup mode. Files already saved to disk are unchanged.

If a previous camera driver call is still blocked, RST ALL briefly waits for it to release, then may attempt one targeted Windows device restart for that camera. Windows requests administrator permission (UAC); restarting the device may restore its hardware settings. Recovery can fail: follow the displayed instructions to close and reopen ViTiny UM, reconnect the microscope, or restart Windows if requested.

FIT is the minimum useful zoom: the complete image is centred without shrinking below the fitted size. Resizing, maximizing or restoring the window runs one delayed FIT after the new size becomes stable.

Drag the Inspection window to move it. Double-click it to hide it; double-click the small information button to restore it. Screen Magnification is an estimate derived from displayed width and a calibrated or clearly marked REF FOV; it is not the optical magnification of the microscope.

3. CAM — USB/UVC Camera

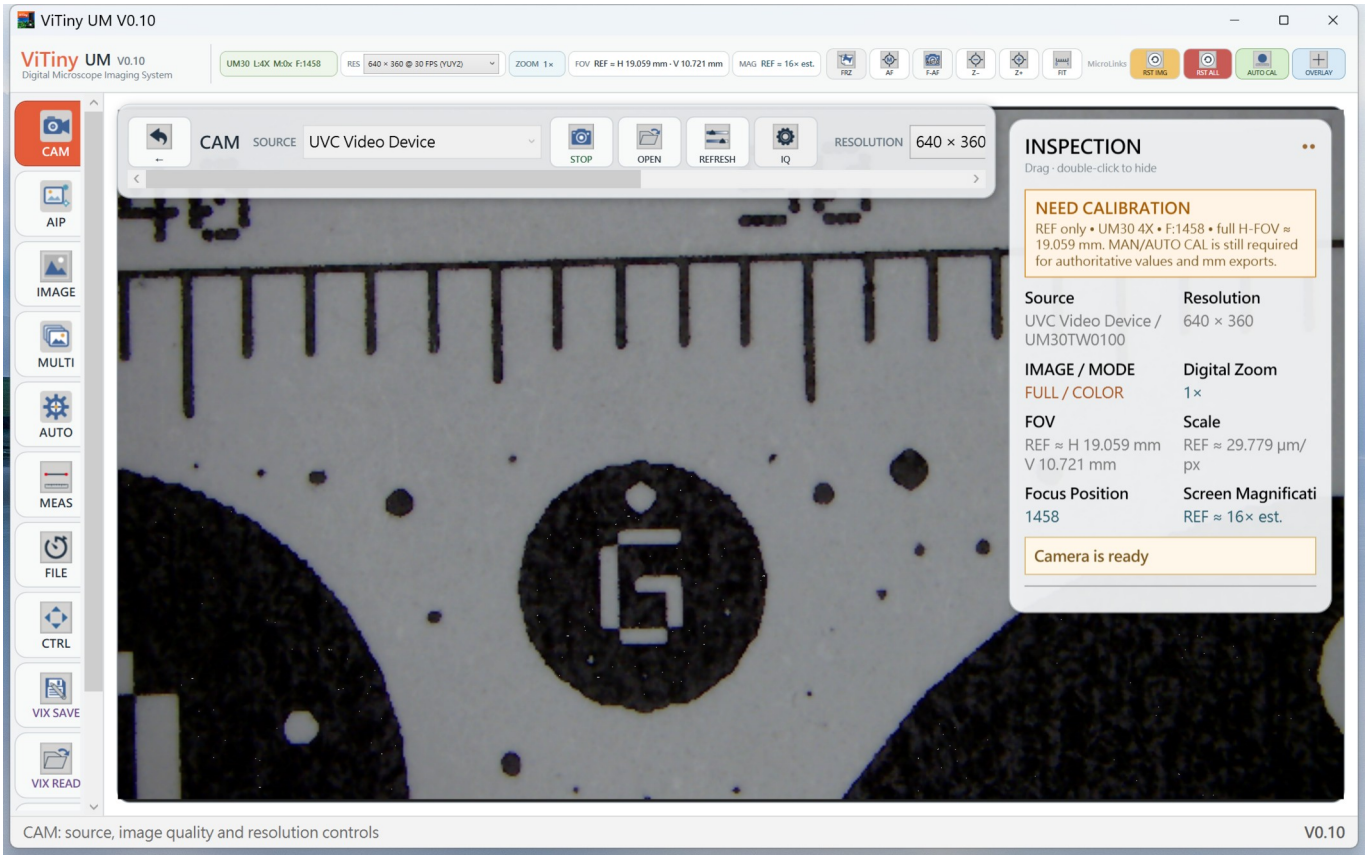


Figure 2. CAM source and stream controls

V0.10 reference screenshot (2026-08-19). In V0.11, CAM OPEN is removed; use FILE > LOAD. TEST ALL is started explicitly.

CAM selects a Windows video device, starts or stops LIVE, refreshes the device list and exposes supported UVC image-quality controls. Use FILE > LOAD to open an image or video. RES lists each pixel size once, keeps the active size selected and prefers MJPEG when equivalent modes exist. RES is locked while F-AF, AUTO EDF, HDR or AUTO CAL owns the camera. A driver-advertised mode can still fail because of bandwidth, cable, hub or firmware limitations.

Startup attempts LIVE with an available suitable camera; it does not automatically test every resolution. Use CAM > TEST ALL when you want to validate additional camera modes. Allow each test and the return to LIVE to finish before changing modes again.

ViTiny UM identification accepts either a verified CP2102 controller serial beginning with UM or an older microscope whose UVC USB serial begins with UM (for example UM12xxx). If neither identity is present, trial use is limited to the camera's lowest declared resolution. LIVE is allowed only when that lowest resolution is no greater than 640 × 480; otherwise the camera is disabled. Resolution selection and UVC IQ remain locked in trial mode, while IMAGE, AIP, MULTI, AUTO, MEAS and FILE can still be evaluated.

MJPEG normally uses less USB bandwidth than uncompressed YUY2/NV12 at the same resolution. High resolution, high frame rate and uncompressed formats increase bandwidth and processing load. If the image is black or unstable, first try a verified lower-bandwidth mode.

Do not switch formats or start/stop repeatedly while the camera or driver is still releasing. If another camera application such as AMCap is open, close it and allow the driver to release before starting LIVE in ViTiny UM.

Some microscopes draw more current because their illumination and focus motor share USB power. A powered USB hub is recommended when the device disconnects, fails on the second start, flickers or becomes unavailable. Use a short, good-quality cable and avoid unpowered extensions.

IQ controls are read from the active UVC driver. Unsupported controls remain unavailable. RESET writes the driver-advertised defaults. AF, Z and LED controls require a compatible ViTiny UM controller and cannot be assumed to work on a general UVC camera.

Function details and on-screen hints

Function	Operating guidance
CAM	Select a camera and start LIVE. Devices without verified ViTiny UM identity use trial resolution limits.

4. AIP — Advanced Image Processing

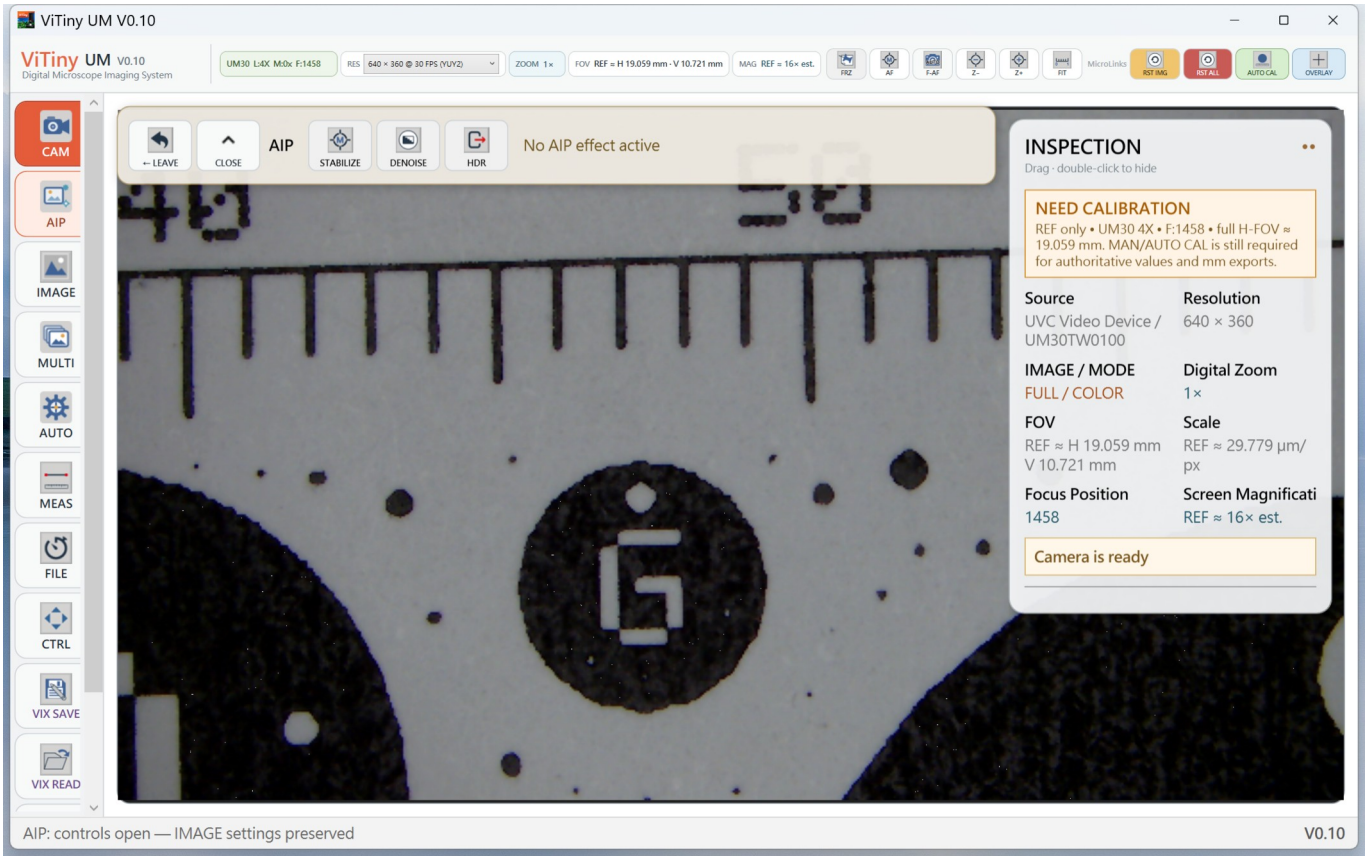


Figure 3. AIP processing controls

Actual connected-device example captured on 2026-08-19. Values vary by device and setup.

STABILIZE reduces display motion by aligning live frames. SOFT has the least crop, STANDARD is the normal choice and STRONG permits a larger correction. It is display processing, not a mechanical anti-vibration system.

DENOISE combines temporal information while protecting moving details. A longer history reduces stationary noise but reacts more slowly and can leave trails if Motion Guard is too weak. Use A/B to compare the original and processed image. RESET clears the temporal history.

HDR combines LOW / MID / HIGH exposures. CAPTURE is intended for a still sample. LIVE HDR continuously cycles exposures and can be slower or show motion artifacts. Keep the specimen, microscope and illumination stable; CLEAR returns to normal Live.

AIP remains active when its panel is closed. Its icon stays red until the corresponding effect is turned OFF or cleared. AIP is applied before IMAGE; FILE PHOTO contains the clean processed result, while RAW preserves the unprocessed camera frame.

Function details and on-screen hints

Function	Operating guidance
AIP	Stabilize, Denoise and HDR remain active after this panel closes. Use each feature's OFF or CLEAR command to return it to the initial state.
AIP · Stabilize	SOFT minimizes crop, STANDARD is recommended, STRONG permits larger correction. Stabilization reduces display motion but does not replace a stable stand.
AIP · Denoise	More history reduces stationary noise but reacts more slowly. Use Motion Guard for moving detail, A/B to compare, and RESET after the scene changes.

Function	Operating guidance
AIP · HDR	Keep the sample still while LOW/MID/HIGH exposures are collected. LIVE HDR is slower and can show motion artifacts; CLEAR returns to normal Live.

5. IMAGE — ROI, Display, PIP and Recognition

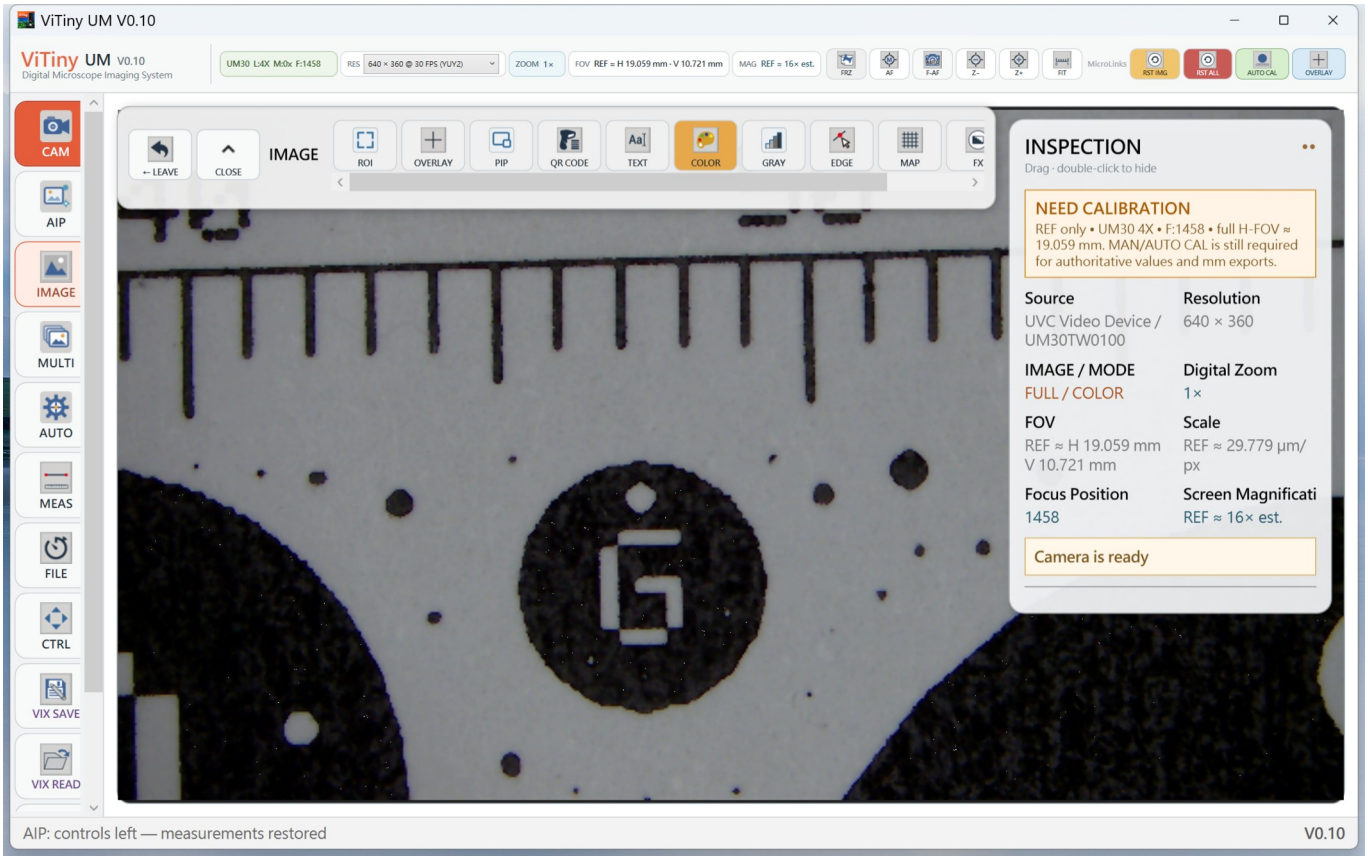


Figure 4. IMAGE processing categories

Actual connected-device example captured on 2026-08-19. Values vary by device and setup.

IMAGE is divided into ROI, OVERLAY, PIP, QR CODE, TEXT, COLOR, GRAY, EDGE, MAP, FX and ANALYZE. Only the selected category's second row is shown.

ROI 200 / 400 / 800 limits IMAGE effects to the orange square; drag inside the square to move it. FULL applies the effect to the complete image. OFF removes the ROI frame. ROI does not modify the RAW source.

OVERLAY provides OFF, CENTER, SCALE, GRID and ALL. The calibrated scale uses the current calibration; verify calibration after changing source, resolution, optical setup or any operation that changes the relationship between pixels and the specimen.

PIP S→L magnifies a selected local area and intentionally locks the main image Zoom/Pan. PIP L→S shows an overview with a navigation frame while the main image can be zoomed and panned. LOCK fixes the sampling position. EXIT always leaves PIP.

COLOR contains original colour, individual RGB channels, HSV and LAB views. GRAY contains gray, binary, adaptive binary and CLAHE. EDGE contains edge/Sobel/Canny. MAP contains false-colour maps. FX contains sharpen, emboss, invert and Gamma. These are visualization tools and may alter apparent boundaries.

ANALYZE displays Histogram, Color and Focus curves. These fields are information, not measurement results. QR and TEXT read the original colour frame and are mutually exclusive with PIP. OCR accuracy depends on focus, contrast, language, font, orientation and image quality; always verify recognized text before use.

Function details and on-screen hints

Function	Operating guidance
IMAGE	Choose one category, then its second-row option. IMAGE changes displayed pixels; RAW remains unprocessed. Recheck calibration before precision measurement after optical or source changes.
IMAGE · ROI	200/400/800 applies IMAGE effects only inside the orange square. Drag inside it to move. FULL uses the complete image; OFF removes the frame.

Function	Operating guidance
IMAGE · Overlay	CENTER, SCALE, GRID or ALL are display guides. SCALE is meaningful only with valid calibration for the current source and optical setup.
IMAGE · PIP	S→L magnifies a local area and locks main Zoom/Pan. L→S is overview navigation and leaves main Zoom/Pan available. Use EXIT to close PIP.
IMAGE · QR Code	QR reads the original colour frame. Review the recognized address before OPEN LINK; untrusted QR links can be unsafe.
IMAGE · Text OCR	Drag a rectangle, then READ; no rectangle reads the full original image. OCR can be wrong—verify focus, language, orientation and every important character.
IMAGE · Color	View original colour, RGB channels, HSV or LAB. These display modes help inspection but do not change RAW capture data.
IMAGE · Gray	GRAY, binary, adaptive binary and CLAHE can improve feature visibility. Thresholding can shift apparent edges; verify before measuring.
IMAGE · Edge	EDGE, Sobel and Canny emphasize intensity transitions. Detected lines are visual aids, not calibrated object boundaries.
IMAGE · Map	JET, HOT and TURBO are false-colour visualizations of intensity. Colours are not temperature unless a calibrated thermal source explicitly provides temperature data.
IMAGE · FX	Sharpen, Emboss, Invert and Gamma alter appearance. Avoid using heavily processed edges as the only basis for precision measurement.
IMAGE · Analyze	Histogram, Color and Focus curves are live information displays. They are not buttons or saved measurement results.

6. MULTI — Multi-Image Processing

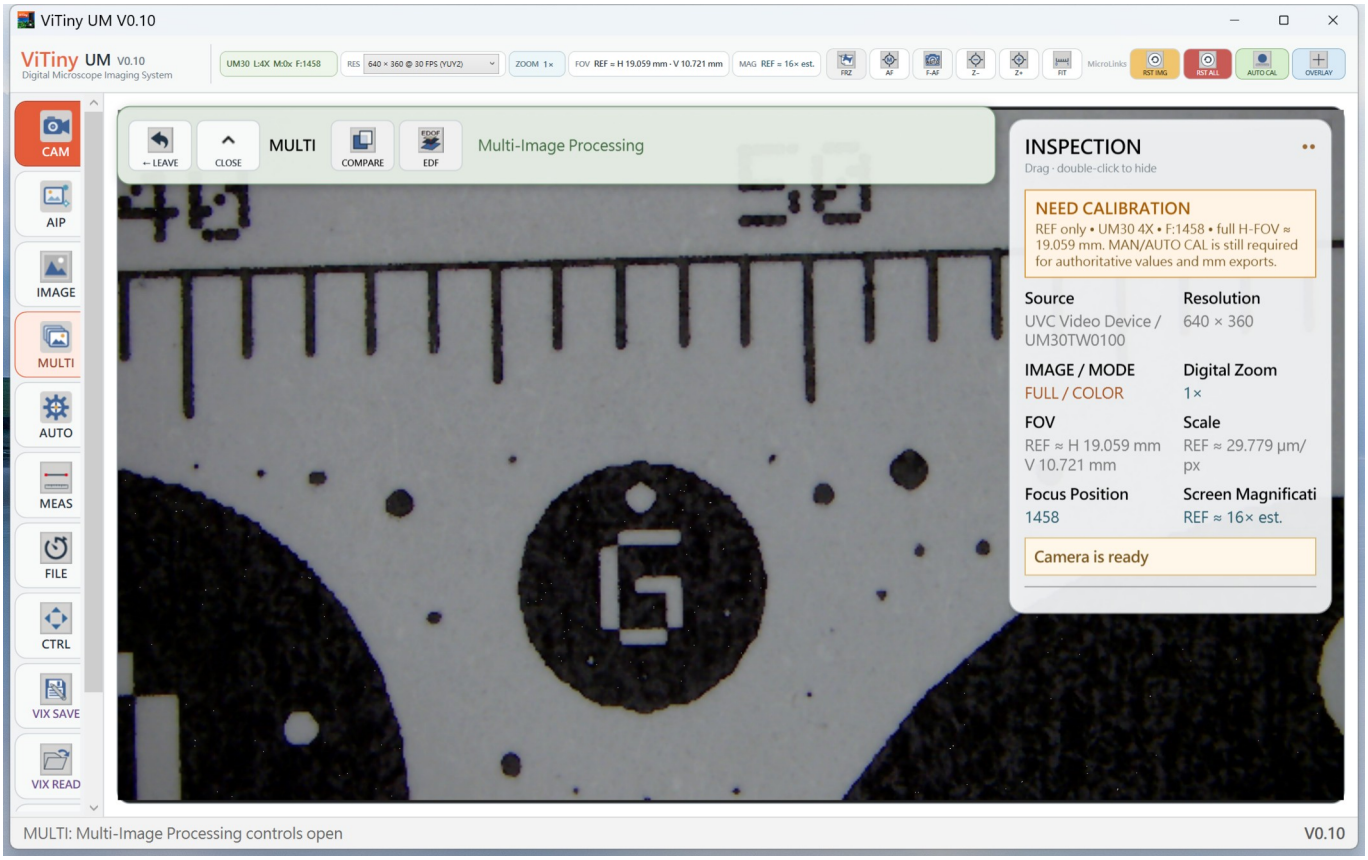


Figure 5. MULTI comparison and EDF controls

Actual connected-device example captured on 2026-08-19. Values vary by device and setup.

MULTI groups special processing that uses two or more images. It contains COMPARE and EDF, while AUTO is reserved for automatic geometry and measurement recognition.

COMPARE stores or loads a reference. REF and LIVE show either source; SPLIT shows both; MIX overlays them. Move or nudge the reference to align it and adjust opacity. CLEAR removes the reference.

EDF combines multiple processed focus planes. MANUAL uses START, ADD and GO. AUTO stores focus endpoints A/B, selects the frame count, and scans in one direction. Keep the specimen still and make sure the focus mechanism has a safe travel range.

Function details and on-screen hints

Function	Operating guidance
MULTI	Use COMPARE for a reference/live comparison and EDF to combine multiple focus planes. These multi-image tools keep their results when the panel closes.
MULTI · Compare	Capture/load a matching reference, then use REF, LIVE, SPLIT or MIX. In MIX, align the reference and set opacity; CLEAR removes it.
MULTI · EDF	Combine multiple focus planes while keeping the specimen still. For AUTO, set safe A/B focus endpoints and use a one-direction scan.

7. AUTO — Automatic Geometry

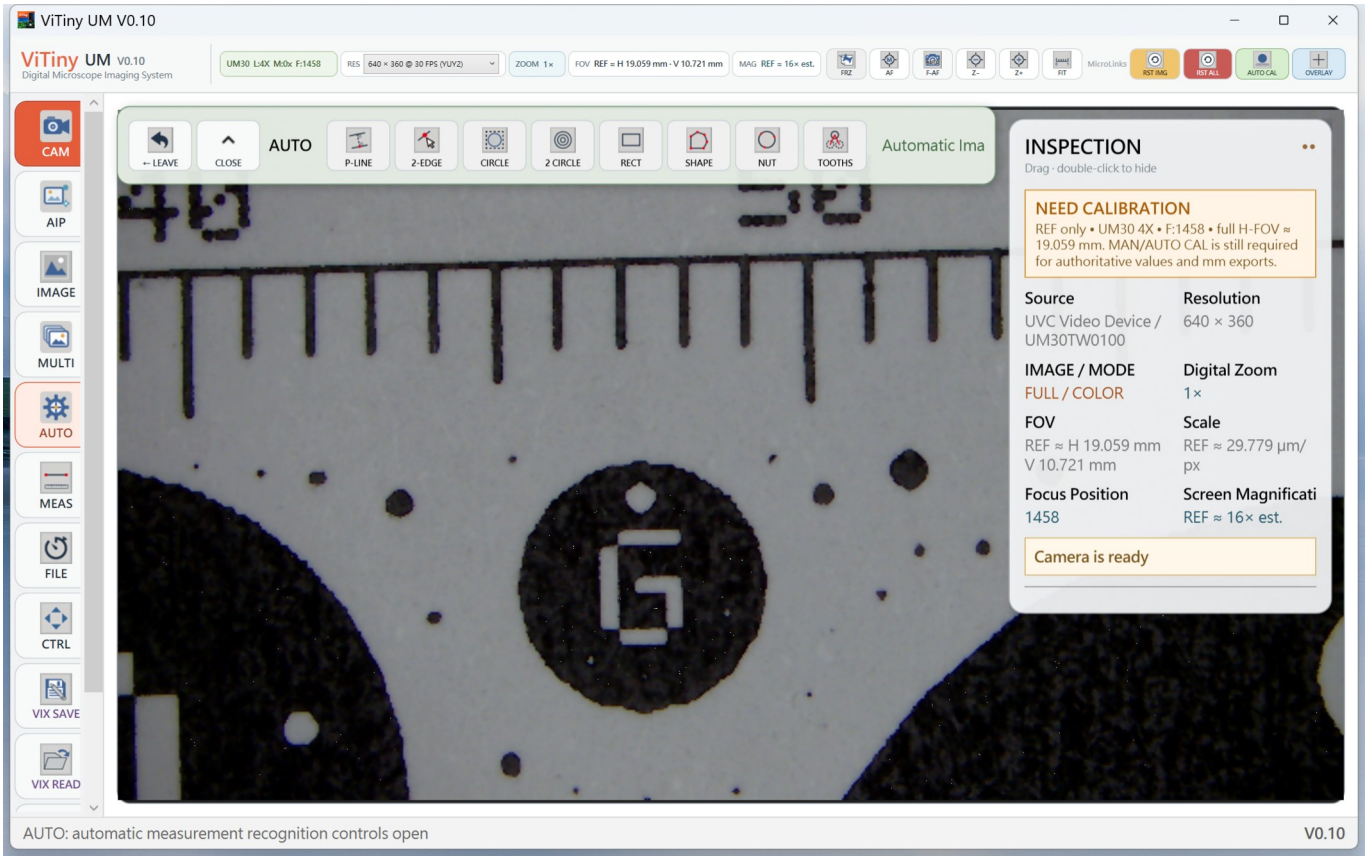


Figure 6. AUTO geometry controls

Actual connected-device example captured on 2026-08-19. Values vary by device and setup.

AUTO provides P-LINE, 2-EDGE, CIRCLE, 2-CIRCLE, RECT, SHAPE, NUT and TOOTHS. Automatic results are image-analysis suggestions and must be checked by the operator before acceptance.

P-LINE detects two parallel lines and measures their spacing. 2-EDGE selects one boundary on each of two objects and measures the minimum distance between those edges. CIRCLE detects one circumference. 2-CIRCLE detects two circles and transfers centre-to-centre distance. RECT detects a rectangular boundary. SHAPE transfers a closed contour as a polygon.

NUT detects an outer hexagonal boundary and centre hole. TOOTHS estimates a complete gear period from a selected outer tooth and detects the centre bore. Clean contrast, a complete visible boundary, correct focus and minimal perspective distortion are essential.

NEW or CLEAR restarts selection on the same source. ACCEPT transfers the result to MEAS. EXIT cancels the Auto session and resumes Live when Auto had frozen it. Automatic detection does not replace calibration.

Function details and on-screen hints

Function	Operating guidance
AUTO	Automatic geometry is an operator-assisted suggestion. Check the detected boundary, then ACCEPT to transfer it to MEAS. Calibration is still required for real units.
AUTO · P-Line	Detect two parallel lines and measure their spacing. Check both detected lines, then ACCEPT to create one MEAS distance.
AUTO · 2-Edge	Click one boundary on the first object, then one boundary on the second object. The closest detected edge points define the minimum distance transferred to MEAS.
AUTO · Circle	Click a clear circumference. Check centre and radius before ACCEPT transfers the circle to MEAS.

Function	Operating guidance
AUTO · 2-Circle	Select two clear circular boundaries. ACCEPT creates their centre-to-centre MEAS distance.
AUTO · Rectangle	Select a clean rectangular edge. Perspective and incomplete borders reduce accuracy; check all four corners before ACCEPT.
AUTO · Shape	Select one closed high-contrast object. Check the detected contour before transferring it to MEAS as a polygon.
AUTO · Nut	Select the outer hexagonal edge. Check both hex outline and centre hole before ACCEPT.
AUTO · Tooths	Select a clear outside tooth on a complete gear. Check tooth count, outline and centre bore before ACCEPT.

8. MEAS — Calibration and Measurement

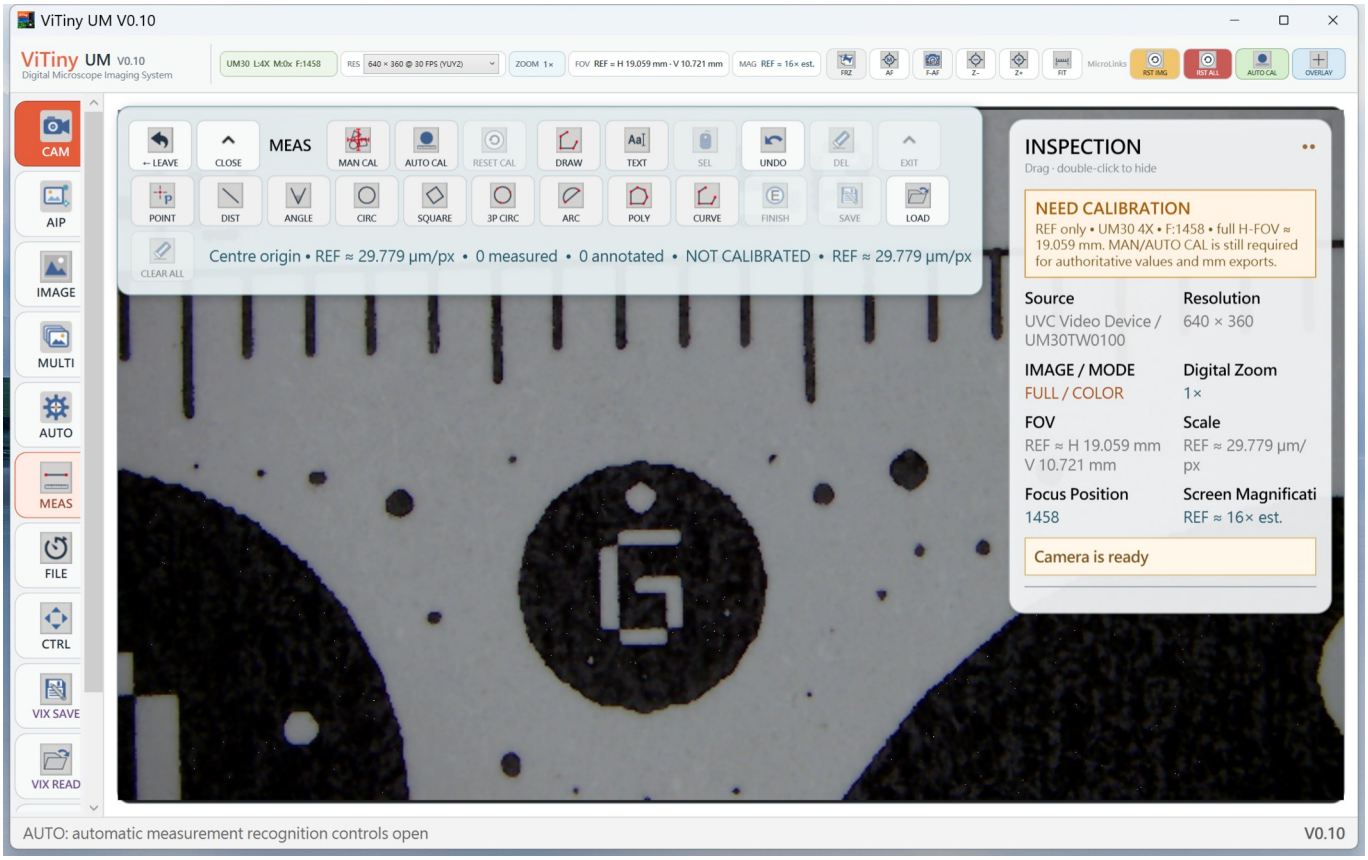


Figure 7. MEAS calibration and measurement controls

Actual connected-device example captured on 2026-08-19. Values vary by device and setup.

MAN CAL uses two points on a known length and the entered millimetres. AUTO CAL scans a supported calibration marker. While Need Calibration remains active, a supported Live UM microscope can show approximate REF ≈ measurements from its model, R000D Lens Type, R0009/R000A Focus Position and FOV table. REF never becomes Calibration; CSV/DXF stay in pixels, and external images or loaded VIX previews never inherit the current Live REF. Remove formal calibration when the source, resolution, optical magnification, focus geometry, adapter or working distance changes.

AUTO CAL supports the 20-level pattern from A = 30 mm to Y = 0.05 mm: A B C D E F G H J K L M N P R T U V X Y. The first press shows the green placement guide; keep one complete labelled circle inside it and press AUTO CAL again to scan. A usable detected circle can be reviewed even if the letter is wrong or missing. The confirmation window shows the selected reference diameter and proposed scale.

In AUTO CAL review, ACCEPT confirms the current letter. Click the correct letter button, or press its English letter key when you are not editing the input box, to confirm that letter immediately. To edit in the input box, enter one supported letter and then choose ACCEPT; invalid or multiple letters cannot be accepted. If the circle is outside the green safe box, letter buttons and keys only select a letter: review the warning and choose ACCEPT ANYWAY to apply it. If no letter matches, press Esc or CANCEL; closing the window also preserves the existing calibration.

The coordinate origin is the image centre: X is positive right and negative left; Y is positive up and negative down. POINT reports coordinates. DIST, ANGLE, CIRCLE, RECT, 3P CIRCLE, ARC, POLY and CURVE create measurement objects from clicked points.

The edit controls begin DRAW, TEXT, SEL, UNDO, DEL. DRAW records a direct freehand stroke. TEXT accepts 1–200 characters at 12–96 pt; after ACCEPT, the completed text follows the pointer as a live preview until a left click places it. Both use image coordinates and remain aligned while Zoom/Pan changes. They appear in SCREEN/SAVE ALL and are saved as annotation data in CSV/DXF. PHOTO/RAW and editable VIX object data exclude them. RST IMG preserves them; CLEAR ALL and RST ALL remove them.

A stationary press of about two seconds selects an existing measurement under mouse, touch or pen without first committing the armed tool's short click. Control points are tested before object bodies with a fixed 56-screen-pixel radius. Moving cancels the long press; an empty press selects nothing; DRAW/TEXT are not long-press targets. SEL

cycles completed measurements and annotations, and the gold handles can be dragged. During normal point creation, right-click or UNDO removes the latest step; POLY/CURVE can be completed with FINISH.

AUTO CAL uses one generic 75% controlled-glyph threshold for the supported alphabet, with no special E path. If isolated-element OCR is empty, a repeated-glyph text-line fallback is tried; the operator must still review the marker result. SAVE writes matching CSV and DXF measurement and annotation data; LOAD restores the measurements and DRAW/TEXT annotations from CSV, replacing the current set. Confirm the destination shown by the Windows file dialog.

Precision depends on calibration quality, image resolution, focus, lens distortion, perspective, specimen flatness and point placement. Do not use blurred, heavily processed or uncalibrated images for precision work. Recheck a known reference before recording critical results.

Function details and on-screen hints

Function	Operating guidance
MEAS	Calibrate before measuring real units. Image centre is (0,0): X right positive, Y up positive. Right-click equals UNDO; for POLY/CURVE, the first right-click finishes and the next right-click removes it.

9. FILE — Images, Video and Calibration Pattern

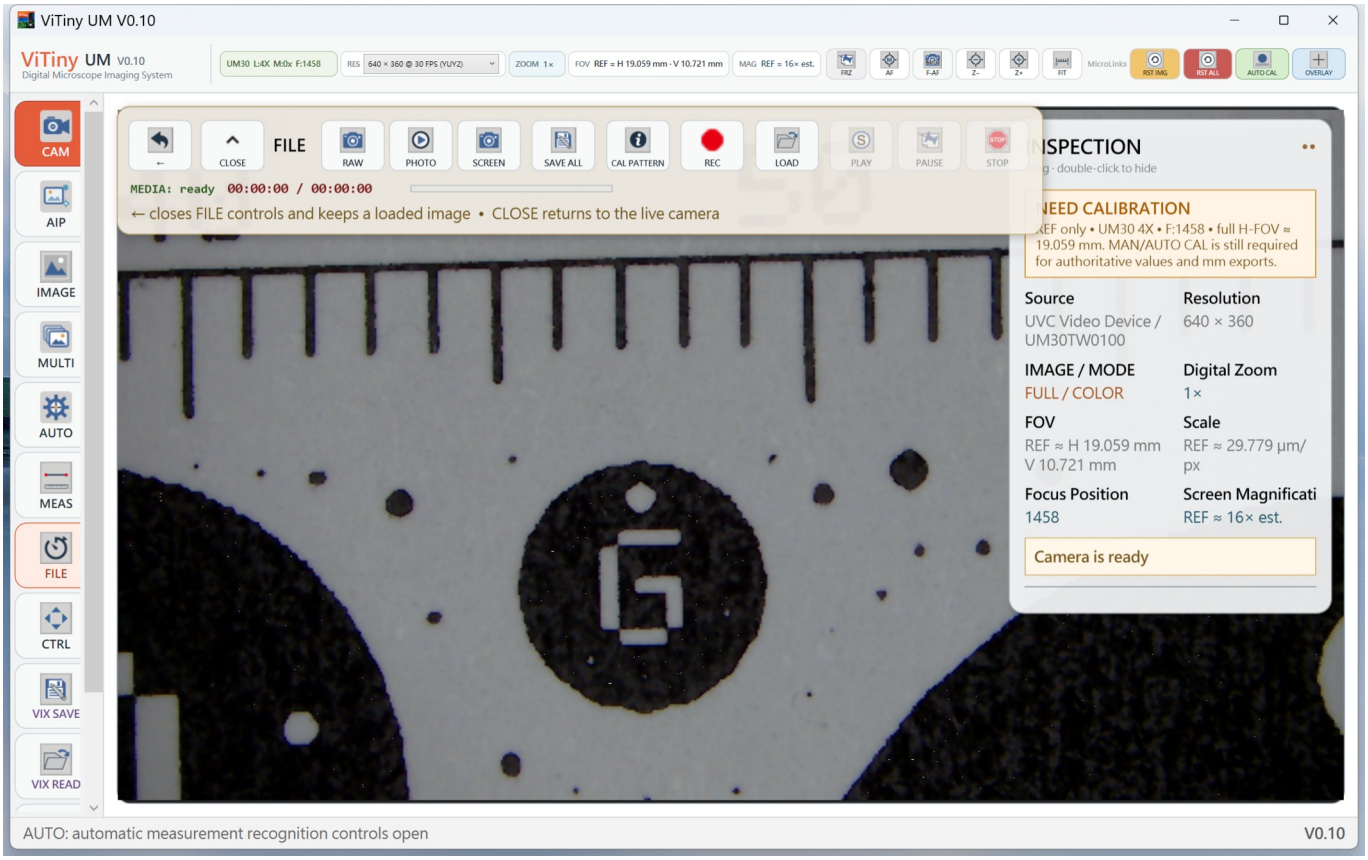


Figure 8. FILE capture and media controls

Actual connected-device example captured on 2026-08-19. Values vary by device and setup.

RAW saves the unprocessed negotiated camera frame. PHOTO saves the clean AIP + IMAGE + MULTI/AUTO result without screen graphics. SCREEN saves the visible viewport including Overlay, PIP, Compare, measurements and DRAW/TEXT annotations. SAVE ALL writes matching RAW, PHOTO and SCREEN files with one timestamp.

REC records processed live frames as Motion-JPEG AVI. Actual smoothness depends on source frame rate, resolution, storage speed and processing load. Do not disconnect the camera or close the program while recording is being finalized.

LOAD opens supported images or videos; embedded ViTiny capture metadata is read from still images when present. LIVE returns to the camera. A loaded image may have different pixel dimensions; incompatible image-space measurements are cleared rather than silently reinterpreted.

CAL PATTERN works without a camera. It saves matching SVG and GBR files to Downloads/ViTiny UM/Calibration Pattern under the current Windows user folder. The output is A4 1-up: one 70 × 30 mm tile with 245 circular markers across 20 sizes, from A = 30 mm to Y = 0.05 mm. The letters are A B C D E F G H J K L M N P R T U V X Y.

The separate manufacturing reference is a 10-up sheet; CAL PATTERN produces the single-tile 1-up master. Print or plot at 100% / 1:1, disable Fit to Page, and verify the edge ruler and a known marker diameter before calibration. See MEAS for AUTO CAL placement and letter confirmation.

FILE save commands ask for a destination folder and show the generated filename. TEXT OCR is saved to Downloads/ViTiny UM. MEAS CSV/DXF and VIX use Windows save/open dialogs. Keep files needed for traceability together with their calibration and VIX state.

Function details and on-screen hints

Function	Operating guidance
FILE	RAW = camera frame; PHOTO = clean processed image; SCREEN = visible viewport with graphics. SAVE ALL uses one timestamp. CAL PATTERN writes matching A4 vector SVG and GBR files. Do not close while REC is finalizing.

10. CTRL and VIX

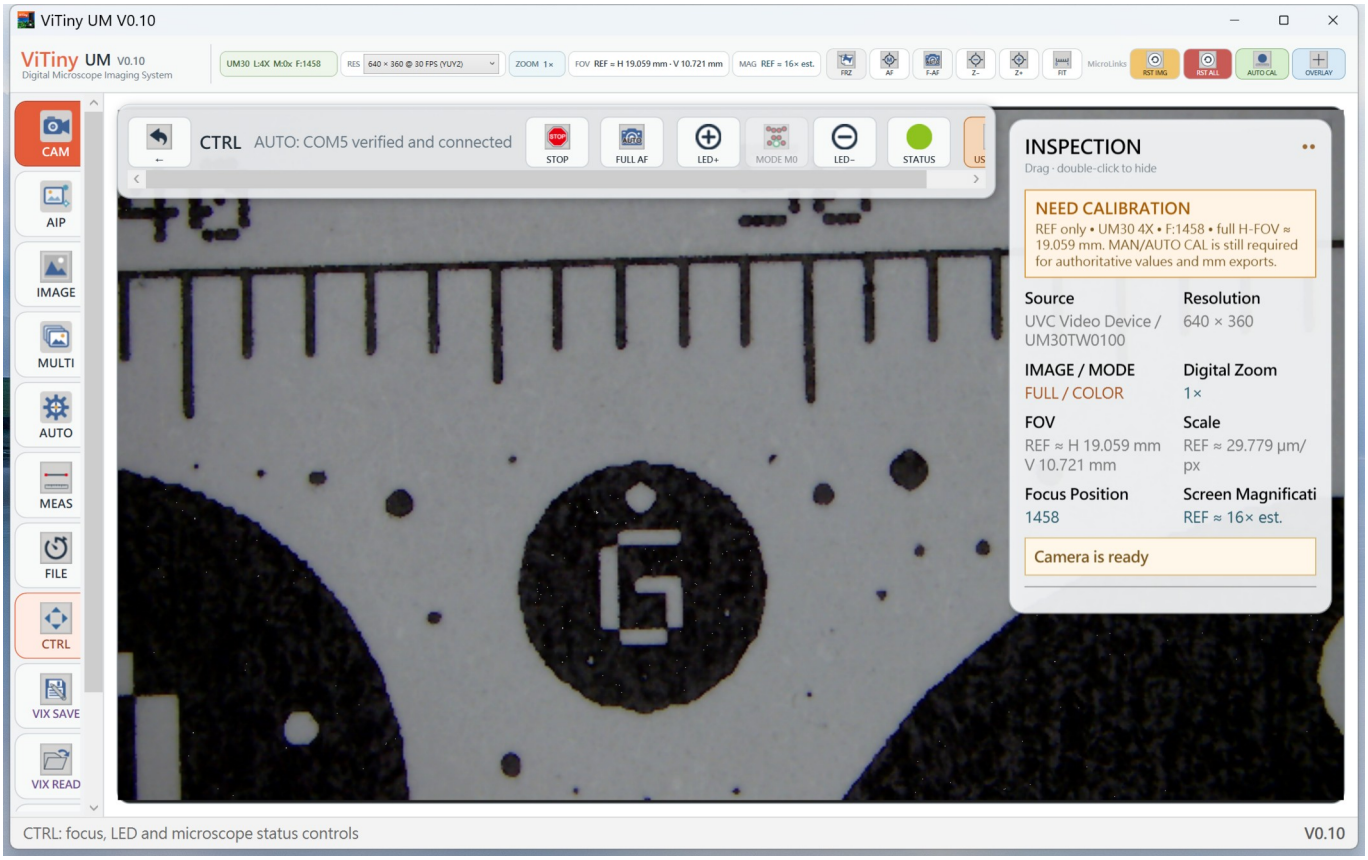


Figure 9. CTRL connected-controller example

Actual connected-device example captured on 2026-08-19. Values vary by device and setup.

CTRL operates compatible ViTiny UM hardware. AF performs one controller autofocus command. F-AF / FULL AF first opens an orange Focus ROI without moving the motor; drag inside the box to move it or drag any orange corner handle to resize it, then press START AF. Full Area AF prefers 640 × 360 (otherwise the smallest verified mode), moves to absolute 0, waits for a settled fresh baseline, issues one continuous 0→Travel Max move while sampling fresh position/frame pairs about every 50 ms, refines ±100 in 10-position steps, returns to the strongest point for a fresh verification frame, then restores the exact prior resolution. The stage indicator reports 1/5–5/5. CANCEL or STOP releases every focus key and stops safely. Hold Z− or Z+ to move focus and release to stop. LED− / LED+ change brightness while held; LED MODE cycles supported lighting modes.

Always observe the mechanism while moving focus. Stop immediately if travel approaches a mechanical limit, the sample, lens or stage. Software commands do not replace mechanical clearance and safe operating practice.

CTRL > USB RESET preserves the software workspace, measurements and calibration, finishes recording, and asks Windows to restart the identified UVC camera and CP2102 controller devices. Approve the administrator permission (UAC) prompt to proceed. It then rescans the devices and attempts to restore the previous LIVE mode when LIVE was active or recovery was pending. Device settings may return to defaults; USB RESET does not cut the USB hub's 5 V power.

VIX SAVE stores the original image, screen image, measurements, calibration and supported workspace settings in one VIX ZIP archive. DRAW/TEXT annotations may appear in the saved screen image, but VIX does not store or restore them as editable objects. VIX READ previews and restores selected saved state. Treat VIX as a project workspace, not as a substitute for independent backups or validated measurement reports.

A VIX created by another version may contain unsupported or newer fields. The loader preserves compatibility where possible, but the operator should verify image, calibration, measurement objects and active modes after loading.

Function details and on-screen hints

Function	Operating guidance
CTRL	Focus and LED commands require a compatible ViTiny UM controller. Hold movement keys only while observing safe mechanical clearance; release or press STOP immediately when needed.
VIX	VIX SAVE keeps image plus supported workspace state in one VIX ZIP. DRAW/TEXT may appear in its screen image but are not restored as editable objects. After VIX READ, verify calibration, measurements, image modes and source before continuing critical work.

11. Mouse, Touch and Display

Roll the mouse wheel forward to zoom in toward the pointer and backward to zoom out. Press and hold the middle mouse button (the wheel) while dragging to Pan. FIT returns to complete-image view and centre.

When IMAGE → ROI is open, dragging inside the orange ROI moves it. In PIP, dragging and Zoom/Pan behavior depends on S→L or L→S. In COMPARE MIX, dragging aligns the reference. In MEAS, mouse, touch and pen short clicks create points; a stationary press of about two seconds selects an existing measurement; SEL drags its gold control point or a DRAW/TEXT handle.

The program gives the active tool priority so that one gesture does not move both the image and an object. If an unexpected item moves, exit or finish the current ROI, PIP, COMPARE, MULTI, AUTO or MEAS operation first.

At very high Digital Zoom, pixels are enlarged but no new optical detail is created. Use optical focus, suitable working distance and sufficient source resolution before relying on digital enlargement.

12. Troubleshooting

No camera: reconnect the device, refresh CAM, try another USB port/cable, close other camera applications and check Windows Device Manager. A composite microscope may expose video and serial-controller interfaces separately.

Black image after LIVE: select a verified mode, reduce resolution/FPS or choose MJPEG, then stop and restart after the driver releases. If every application fails, power, cable, hub, camera firmware or the device itself is more likely than a ViTiny UM setting.

Second start fails or the camera disappears: illumination or motor load may be exceeding available USB power. Use a powered hub. Allow several seconds between applications so the Windows camera driver can release its handle.

Previous driver call still blocked: wait for the current operation to finish. CTRL > USB RESET attempts device recovery while preserving the workspace; RST ALL also clears the workspace and attempts to return to LIVE. If recovery cannot release the driver, follow the prompt to close ViTiny UM completely and reopen it or reconnect the microscope. If Windows requests a restart (code 3010), save your work and restart Windows; the application does not reboot Windows automatically.

Image pauses periodically: disable unnecessary ANALYZE curves, high-cost AIP modes or excessive resolution and test again. Also check storage activity during recording and USB power stability.

Measurement looks wrong: confirm the source resolution and calibration, return Digital Zoom/FIT as needed, inspect point placement, and compare against a known reference. IMAGE effects and Auto detection can change apparent edges even though the underlying calibration value remains stored.

13. Safety, Privacy and Disclaimer

ViTiny UM is an imaging, observation and measurement-assistance tool for compatible digital microscopes. It is not a medical diagnostic device, life-safety device, certified metrology instrument or substitute for professional judgement. Do not use it as the sole basis for medical, safety-critical, regulatory or acceptance decisions.

The operator is responsible for correct hardware setup, electrical/USB safety, mechanical clearance, calibration, measurement procedure, interpretation and file retention. Automatic focus, recognition, OCR, EDF, HDR and geometry results can be incomplete or incorrect.

ViTiny UM performs camera, image, serial-controller, OCR and file operations locally. It contains no analytics, telemetry or automatic cloud upload. The selected Help language and Hint display duration are stored locally under the current Windows user profile.

OPEN LINK for a QR result launches the Windows default browser. From that point, the destination website and browser have their own privacy and security behavior. Inspect the recognized address before opening it; do not open an untrusted QR link.

To the maximum extent permitted by applicable law, the software is provided without warranty of uninterrupted operation or fitness for a particular measurement purpose. MicroLinks is not responsible for loss caused by incorrect setup, calibration, recognition, interpretation, unsupported hardware, power failure or loss of files. Applicable mandatory consumer rights are not excluded.

14. Product, Copyright and Open Source

Product: ViTiny Digital Microscope / ViTiny UM for Windows. Company: MicroLinks Technology Co. Website: www.vitiny.com. Program design: Y.C. Li.

ViTiny UM application code, user interface, product graphics and documentation are proprietary to MicroLinks unless a file states otherwise. Product and company names may be trademarks of their respective owners.

This version uses ZXing.Net 0.16.9 for QR/barcode decoding under Apache License 2.0; Microsoft .NET / WPF and the System.IO.Ports 10.0.0 and System.Management 10.0.0 packages under the MIT License; and Windows camera, imaging and OCR APIs supplied as part of Microsoft Windows / Windows SDK under their applicable Microsoft terms.

Third-party components remain the property of their authors. Their licenses do not grant rights to the ViTiny or MicroLinks names, artwork or proprietary application code. Full source links, package versions and license references are in licenses/OPEN_SOURCE_NOTICES.md included with the source project.

Copyright © 2026 MicroLinks Technology Co. All rights reserved for the proprietary portions of ViTiny UM.

Appendix A — Standard operating procedures

Calibrated measurement workflow

1. Mount the specimen and stabilize the stand; select and verify the exact CAM mode.
2. Place a traceable length standard in the same focal plane and optical setup as the specimen.
3. Choose MAN CAL or AUTO CAL, review all detected points or marker information, and ACCEPT only a credible result.
4. Return to the specimen without changing source, resolution, lens, working distance or focus geometry.
5. Create the required MEAS objects, use SEL to review/edit, and confirm units and scale status.
6. Save SCREEN or SAVE ALL for visual evidence; export CSV/DXF when structured measurement data is needed.
7. Save a VIX workspace when the image and supported working state must be reopened together.

Caution Available camera formats, motor focus, Full AF, LED control, reference scale and automatic EDF depend on the connected microscope model, firmware and USB controller.

Inspection evidence workflow

1. Record the microscope model, source, format, resolution, optical setup and calibration reference.
2. Use RAW for the untouched camera frame, PHOTO for the clean processed result, and SCREEN for the visible viewport with graphics.
3. Use SAVE ALL when matched outputs with one timestamp are required.
4. Keep exported measurements and the corresponding calibration/VIX workspace together.
5. Review saved files before disconnecting the microscope or closing the application.

Appendix B — Quick command reference

Area	Visible controls	Purpose / critical note
Header	FRZ · AF · F-AF · Z− · Z+	Freeze/unfreeze and compatible controller focus operations; keep mechanical clearance.
Header	FIT · RST IMG · RST ALL	FIT centres the image. RST IMG preserves calibration and measurements. RST ALL clears the workspace, opens CAM and attempts LIVE with a suitable UVC camera.
Header	AUTO CAL · OVERLAY	Start supported marker calibration; show/hide display guides.
CAM	LIVE/STOP · REFRESH · TEST ALL · IQ	Start/stop UVC Live, rescan devices, test additional modes or adjust supported IQ controls. Open media with FILE > LOAD.
AIP	STABILIZE · DENOISE · HDR	Advanced live-image processing; explicitly turn off/clear modes when no longer needed.
IMAGE	ROI · OVERLAY · PIP · QR CODE · TEXT · COLOR · GRAY · EDGE · MAP · FX	Viewing, recognition and pixel-processing tools; RAW stays unprocessed.
MULTI	COMPARE · EDF	Reference/live comparison and extended depth of field.
AUTO	P-LINE · 2-EDGE · CIRCLE · 2 CIRCLE · RECT · SHAPE · NUT · TOOTHS	Operator-assisted geometry; inspect the result before ACCEPT transfers it to MEAS.
MEAS	MAN CAL · AUTO CAL · RESET CAL	Create/remove calibration. AUTO CAL: ACCEPT or a valid letter button/key confirms; Esc cancels. Input-box edits need ACCEPT; warnings need ACCEPT ANYWAY. REF ≈ is not calibration.
MEAS	DRAW · TEXT · SEL · UNDO · DEL	Screen annotations and editing. DRAW/TEXT are included in SCREEN/SAVE ALL and CSV/DXF; they are excluded from PHOTO/RAW and VIX object data.
MEAS	POINT · DIST · ANGLE · CIRC · SQUARE · 3P CIRC · ARC · POLY · CURVE	Measurement objects. Real units require valid calibration.
FILE	RAW · PHOTO · SCREEN · SAVE ALL · CAL PATTERN · REC · LOAD	Capture/export, recording, external media and A4 calibration-pattern output.
CTRL	STOP · FULL AF · LED+ · MODE · LED− · STATUS · USB RESET	Focus/LED need a compatible controller. USB RESET preserves the workspace, ends recording and requests permission to restart identified USB devices.
VIX	VIX SAVE · VIX READ	Save or restore image plus supported workspace state; verify after loading.

Appendix C — Files, outputs and support

Command	Output	Meaning / handling
RAW	Image	Original camera frame without IMAGE/AIP display processing.
PHOTO	Image	Clean processed image without screen-only graphics.
SCREEN	Image	Visible viewport including supported graphics and annotations.
SAVE ALL	Matched image set	Related RAW/PHOTO/SCREEN outputs sharing one timestamp.
REC	Video	Recording output. Do not close the application while finalization is in progress.
CAL PATTERN	SVG + GBR	A4 single-up SVG + GBR; 20 diameter levels A–Y, 245 circles per tile. Use 100% (1:1) and verify physical dimensions. See Appendix D.
MEAS SAVE	CSV / DXF	Structured measurement export; pixels are used when formal calibration is absent.
VIX SAVE	.vix ZIP workspace	Image plus supported calibration, measurement and workspace state; not a substitute for backup or a validated report.
TEXT OCR	.txt	Recognized text; verify every important character.

Support contact

Email: mltc@vitiny.com

Telephone: +886-7-657-9551

Website: https://www.vitiny.com

> **Note** Functional content: ViTiny UM V0.11 built-in Help and verified Windows source. Layout reference: ViTiny USB Microscope Android v1.09 user manual.

Appendix D — V0.11 calibration marker diameters

The table matches the supplied 20-level manufacturing specification and the V0.11 calibration table. Units are millimetres. I, O, Q, S, W and Z are excluded. The A4 single-up file saved by CAL PATTERN and the 10-up manufacturing sheet use the same diameters.

Letter	Reference diameter (mm)
A	30.000000000
B	21.424108932
C	15.299748117
D	10.926115676
E	7.802743081
F	5.572227258
G	3.979333459
H	2.841789117
J	2.029426653
K	1.449288590
L	1.034990554
M	0.739125012
N	0.527836493
P	0.376947551
R	0.269192179
T	0.192240086
U	0.137285751
V	0.098040830
X	0.070014581
Y	0.050000000

These are nominal artwork dimensions, not a certificate of the printed target. Print or plot at 100% (1:1) and verify the physical dimensions. The smallest Y features require 0.0025 mm production capability; a normal office printout may not reproduce them correctly.

Recalibrate with the matching new target before using old measurements or a saved VIX scale. V0.11 does not automatically convert a calibration stored with the old table.

ViTiny UM Windows V0.11 | End of User Manual