INFIRAY OUTDOOR

ZOOM ZH50 V2

Dual Field of View Handheld Imager

InfiRay Outdoor

FCC ID: 2AYGT-ZOOM

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: Changes or modifications not expressly approved by IRayUSA could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

This device was tested for typical body-supported operations and use. To comply with RF exposure requirements, a minimum separation distance of 0.5cm must be maintained between the user's body and the handset, including the antenna. Third-party belt-clips, holsters, and similar accessories used by this device should not contain any metallic components. Body accessories that do not meet these requirements may not comply with RF exposure requirements and should be avoided. Use only the supplied or an approved antenna.

WARNING: CHOKING HAZARD
Children under 3 years old can choke or suffocate on small parts of this product. This product is not a toy; keep out of reach of children.

TABLE OF CONTENTS

1. OVERVIEW

As the pioneer that brought dual FOV functionality into commercial thermal optics, InfiRay Outdoor has changed the market again with an upgraded dual field of view monocular, ZOOM ZH50 V2. The ZH50 V2 provides seamless switching between dual fields of view and delivers tack sharp image quality without the need to refocus. The ZOOM V2 is equipped with an industry-leading 12 µm 640×512 high-resolution sensor featuring ≤25mK sensitivity and its image is displayed on a high-contrast 1440×1080 FHD AMOLED display. Additionally, the ZH50 V2 features built-in audio, image, and video capture with 32 GB of internal memory as well as high-speed wireless streaming via the InfiRay Outdoor App.

2. FEATURES

- 12 µm high-performance thermal detector
- High image quality
- Dual Field of View (FOV) optical zoom lens
- Maximum detection range of 2400 yards
- Two quick-change rechargeable IBP-1 battery packs
- High-resolution 1440×1080 FHD AMOLED display
- 20× eyepiece
- High frame frequency: 50hz
- Digital Zoom: ×1/×2/×3/×4
- Built-in 32 GB storage to support image capture and video recording
- Built-in Wi-Fi module
- Mobile device App compatible
- Ultra-clear mode for advanced image detail
- User-friendly interface
- Pixel calibration functions

3. TECH SPECS

| ZOOM	ZH50 V2	
SENSOR		
Resolution	640×512	
Pixel Size	12 µm	
Frame Rate	50hz	
Sensor Sensitivity	≤25 mK	
Image Processing	MATRIX III	
Core	InfiRay Micro II 640	
OPTICS		
Objective Lens	25 mm / 50 mm	
Magnification	2× / 4×	
Digital Zoom	4×	
Field of View	17.5° × 13.1° 8.8° × 6.6°	
Detection Range	2400 Yards	
Display Type	FHD AMOLED	
Display Resolution	1440×1080	
Color Palettes	White Hot, Black Hot, Red Hot, Color, Red Monochrome, Green Monochrome	
P.I.P.	Yes	
Rangefinder	Stadiametric	
Eye Relief	20 mm	
Diopter Range	-5 to +5	
ELECTRONICS		
Onboard Recording	Video and Image	
Onboard Storage	32 GB	
Wireless Connectivity	Video and Image via App.	
Data/Power Connector	USB-C	
Power Supply	USB-C External, IBP-1 Li-ion Battery Pack ×2 (6+ Hours Each)	
Start Up Time	<10 Seconds, Instant from Standby	
PHYSICAL		
Size	8.66" × 2.32" × 2.83"	8.66" × 2.32" × 2.95"
Weight	22.58 Oz	25.04 Oz
ENVIRONMENTAL/WARRANTY		
Warranty	5 Years	
Housing Material	Polymer	
Ingress Protection	IP67	
Operation Temperature	-4°F~122°F	

4. ACCESSORIES

The ZOOM ZH50 V2 dual field-of-view handheld imager ships with everything you need to get out and hunt.

- Objective Lens Cap for ZOOM
- USB-C to Analog RCA/USB Cable 36"
- IBP-1 Battery Pack
- IBC-1 Battery Charger
- USB Power Adapter
- Storage Bag
- Neck Strap
- Wrist Strap
- Lens Cloth
- User Manual

Replacement accessories are available for purchase. Contact 800-769-7125 or irayusa.com/support.

5. COMPONENTS AND CONTROLS
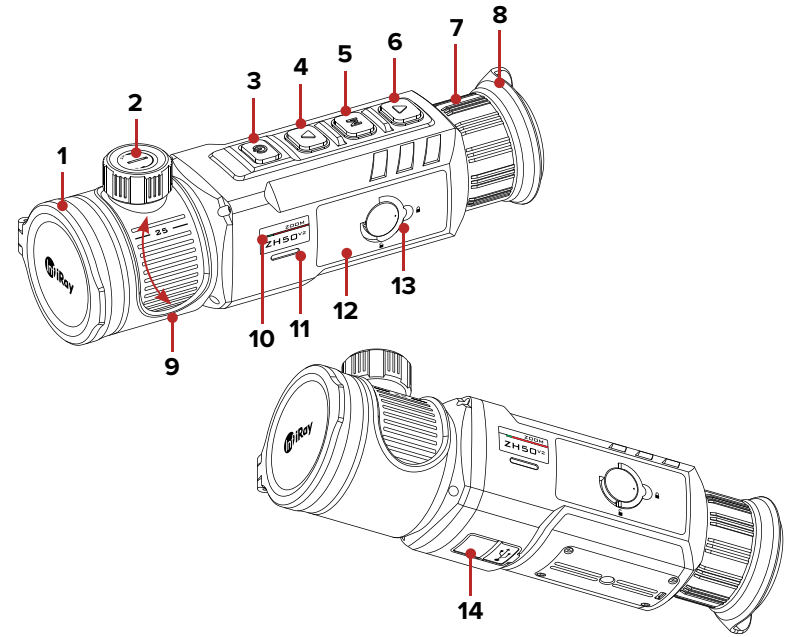
1 Objective Lens Cap

2 Objective Lens Focus Knob

3 Power Button

4 Up Button

5 Menu Button

6 Down Button

7 Eyepiece/Diopter Adjustment Ring

8 Eyeguard

9 Zoom Ring

10 Status Indicator LED

11 Microphone

12 Battery Pack

13 Battery Pack Pull-Ring

14 USB-C Port with Cover

6. DESCRIPTION OF CONTROL BUTTONS AND SHORTCUTS

Power Button ⏻

Current Screen / Menu or Device Status	Short Press	Long Press
Device off	——	Power on the device
Home screen	Enter standby mode	Power off the device
Standby mode	Exit standby mode	——
Main menu	Return to previous without saving changes	——
Defective pixel correction interface	Add or remove a defective pixel from the "to be corrected" list	——

Up Button ▲

Current Screen / Menu	Short Press	Long Press
Home screen	Adjust digital zoom	Turn PIP window on / off
Menu interfaces	Move cursor up	——

Up + Menu Button ▲ + M

Current Screen / Menu	Short Press	Long Press
Home screen	——	Turn stadiametric rangefinder on / off

Menu Button M

Current Screen / Menu	Short Press	Long Press
Home screen	Enter the quick menu	Enter the main menu
Main menu	Change menu options; enter submenu; or confirm submenu changes and return	Save and return to the home screen
Quick menu	Toggle through and confirm menu options	Exit the quick menu
Defective pixel correction interface	Switch between X and Y Axis	Correct pixel(s) and return to previous OR cancel correction and return to previous

Menu + Down Button M + ▼

Current Screen / Menu	Short Press	Long Press
Home screen	——	Turn hotspot tracking function on / off

Down Button ▼

Current Screen / Menu	Short Press	Long Press
Home screen	Take a photo	Start / stop recording video
Menu interfaces	Move cursor down	——

Up + Down Button ▲ + ▼

Current Screen / Menu	Short Press	Long Press
Home screen	Perform a shuttered non-uniformity correction (NUC)	Perform a shutterless non-uniformity correction (NUC)

7. QUICK START GUIDE

Step 1: Prepare to Use the ZH50 V2

1. Compare the box contents to the accessories list and examine each for any shipping damage. See **Accessories** on page 4.

2. Check the lens to ensure there are no smudges or dirt present. Clean with the included lens cloth, if necessary.

3. Charge the battery pack **(12)** using the included battery charger **(16)** before using the ZH50 V2 for the first time. See **Charging the Battery Pack** on the next page.

4. Insert the battery pack into the battery compartment and secure the pull ring **(13)**. See **Installing the Battery Pack** on page 10.

Step 2: Turn On the ZH50 V2

1. Open the objective lens cap **(1)**.

2. Long press the **Power** ⏻ **Button** for 3 seconds to power on the ZH50 V2. The iRayUSA logo will appear.

3. Rotate the diopter adjustment ring **(7)** of the eyepiece until the interface icons are clear.

   WARNING: Do not point the objective lens toward intense energy sources, such as the sun. This may render the electronic components inoperative. The warranty does not cover damage caused by improper operation.

Step 3: Adjust Image Settings in the Quick Menu

Short press the **Menu** M **Button** to enter the quick menu to adjust the following settings (see **Using the Quick Menu** on page 15):

1. Set the color palette to white hot, black hot, red hot, color, red monochrome, or green monochrome.

2. Set the image brightness level, from 1–5.

3. Set the image sharpness level, from 1–5.

4. Set the image contrast level, from 1–5.

Step 4: Adjust Device Settings in the Main Menu

Long press the **Menu** M **Button** to enter the main menu (see **Main Menu Options and Descriptions** on page 23 for detailed instructions) to adjust the following settings:
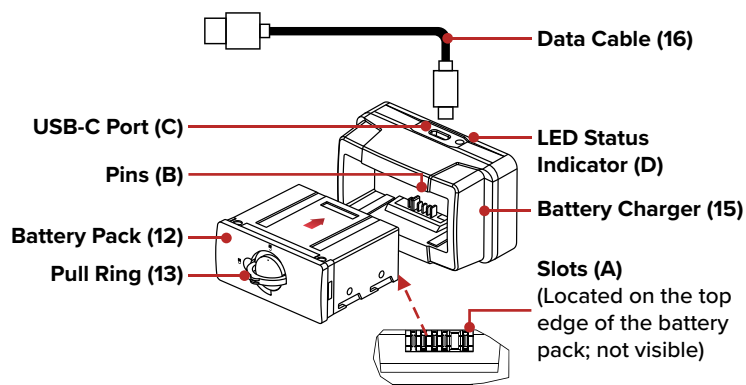
1. Turn on Ultra-clear mode.

2. Set the image hue to warm or cool.

3. Set the non-uniformity correction (NUC) mode to automatic or manual. See **Non-Uniformity Correction** on page 16.

4. Set the date and time.

8. CHARGING THE BATTERY PACK

The ZOOM ZH50 V2 imager comes with two long-lasting rechargeable lithium-ion IBP-1battery packs, which allow for 6+ hours of operation each. IBP-1 battery packs use a cam-locking mechanism to ensure quick and secure battery changes in the field. Fully charge the battery packs before using the ZH50 V2 for the first time.

Charging with the Battery Charger

1. Insert the battery pack **(12)** into the battery charger **(15)**. Align the slots **(A)** on the edge of the battery pack with the pins **(B)** on the inside of the charger.

2. Connect the small USB-C end of the data cable **(16)** to the USB-C port **(C)** on the battery charger.

3. Connect the standard USB end of the data cable to:

   a. The included 5V–2A USB power adapter; **OR**

   b. Any standard USB 3.0 port on a laptop or computer.

Data Cable (16)
USB-C Port (C)
LED Status Indicator (D)
Pins (B)
Battery Charger (15)
Battery Pack (12)
Pull Ring (13)
Slots (A) (Located on the top edge of the battery pack; not visible)

4. During charging, the LED indicator **(D)** on the battery charger will be solid red.

5. When fully charged, remove the battery pack from the charger.

   a. The LED indicator will turn solid green when the battery is fully charged. Do not overcharge.

   NOTE: When the LED indicator flashes red, the battery charger is connected to a power source but no battery pack is installed.

   WARNING: Never use the battery charger with a USB power adapter that is greater than 5V–2A.

## Charging via the USB-C Port

1. Connect the small USB-C end of the data cable to the USB-C port **(14)** on the underside of the ZH50 V2.

2. Connect the standard USB end of the data cable to:

    a. The included 5V–2A USB power adapter; **OR**

    b. Any standard USB 3.0 port on a laptop or computer; **OR**

    c. An external power supply, such as a USB power bank.

 NOTES:

- You may charge and operate the ZH50 V2 at the same time.

- When the battery status icon in the status bar becomes the low battery 🔲 icon, charge the battery right away to avoid over-discharge and a reduction in battery capacity or service life.

- While charging, the battery status icon shown in the status bar will change to the charging ⚡ icon.

9. INSTALLING THE BATTERY PACK

1. Lift the pull-ring **(13)** on the battery pack **(12)** and rotate it clockwise 90 degrees until it is horizontal to the battery pack.

2. Position the battery pack face up with the slots **(A)** facing up.

3. Align the slots **(A)** on the top edge of the battery pack with the pins **(B)** on the inside of the battery compartment, then slide the battery pack into the opening.

Pins (B)
(Located on the inside edge of the battery compartment)

Slots (A)

Battery Pack (12)
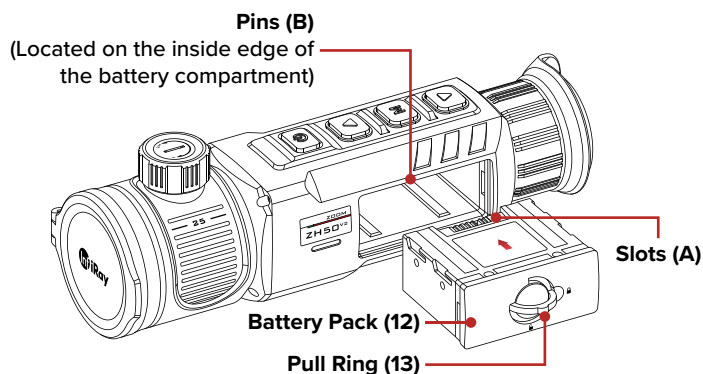
Pull Ring (13)

4. Firmly press the battery in to fully insert it.

5. Rotate the pull-ring counterclockwise 90 degrees to the vertical position to lock the battery pack in place.

6. Flip the pull-ring down so that it is flush with the battery pack.

 WARNING: The ZH50 V2 can only be powered by a factory-supplied IBP-1 battery pack. Using any other battery pack may cause irreparable damage to the device or cause a fire. Any damage from using an improper battery pack will not be covered by warranty.

10. REMOVING THE BATTERY PACK

To remove the battery pack from the ZOOM ZH50 V2:

1. Lift the pull-ring **(13)** on the battery pack **(12)** and rotate it clockwise 90 degrees until it is horizontal to the battery pack.

2. Pull the battery pack out.

11. BATTERY SAFETY WARNINGS

WARNING: Only use the battery charger supplied with the battery pack. The use of any other charger may irreparably damage the battery pack or the charger and may cause a fire. Any damage from using an improper battery charger will not be covered by warranty.

 WARNINGS:

- Do not use a battery charger, power adapter, or USB cable that has been modified or damaged.

- Do not expose the battery to high temperatures or flames, and do not immerse in water.

- Do not leave the battery unattended while charging.

- Do not leave the battery charging for long periods after full charge is reached. Charging time should not exceed 24 hours.

- Keep the battery pack out of the reach of children and pets.

- The battery is equipped with short-circuit protection. However, any situation that may cause short-circuiting should be avoided.

- Do not disassemble, modify, hit, or drop the battery pack.

- Do not connect the battery to any external device with an electrical current that exceeds permitted levels.

- Do not connect an external device with a current supply that exceeds a 3.0 USB port.

To maintain optimal battery capacity and service life:

- Avoid storing a fully charged or discharged battery for long periods. Partial charging of the battery is necessary if the battery will be stored for an extended period.

- Do not charge an extremely cold battery without bringing it into a warm environment. Let the battery warm up for 45 minutes before charging.

- Charge the battery at a temperature range from 32°F to 113°F, otherwise, the service life of the battery may be reduced.

- The recommended operating temperature range is -4°F to 122°F. Avoid using the battery above the maximum or below the minimum recommended temperature range as this may decrease the battery capacity or service life.

12. EXTERNAL POWER SUPPLY

The ZH50 V2 supports the use of an external power supply, such as a 5V mobile power bank.

1. Connect the external power supply to the USB-C port **(14)**.

2. The ZH50 V2 will switch to operation from the external power supply, and the battery pack will begin slowly charging.

3. The battery status icon in the status bar will change to a charging battery ⊡ icon, with the battery color and fill level indicating the current charge. See **Battery Status** on page 14 for additional information.

4. If the external power supply is disconnected, the ZH50 V2 will automatically switch to the battery pack without powering off.

NOTE: Do not connect the ZH50 V2 to an external device with a power supply that exceeds the 3.0 USB cable.

13. OPERATING INSTRUCTIONS

> **WARNING!**
> Don't point the objective lens towards any intense energy sources, such as laser radiation or the sun. This may render the electronic components inoperative. The warranty does not cover damage caused by improper operation.

Using the Control Buttons

The ZOOM ZH50 V2 is operated via four control buttons. The control buttons can be used to perform shortcut operations from the home screen, as well as in the menu and full-screen interfaces. See **Description of Control Buttons and Shortcuts** on page 6 for shortcut button details.

Powering On

1. Open the objective lens cap **(1).**

2. Long press the **Power** ⏻ **Button** for 3 seconds to turn on the ZH50 V2 The iRayUSA logo will appear.

To determine the current battery charge, check the battery icon in the status bar at the top of the screen. See **Battery Status** on page 14.

Powering Off

To power off the ZH50 V2:

1. Long press the **Power** ⏻ **Button**. The shutdown screen will open, showing a 3-second countdown.

2. Continue holding the **Power** ⏻ **Button** until the countdown completes and the imager shuts down.


NOTE: Releasing the **Power** ⏻ **Button** at any time during the countdown will stop the shutdown process and the thermal imager will resume its normal operation.

WARNING: If using an external power supply, do not remove the power supply when saving data, otherwise the data may not be saved.
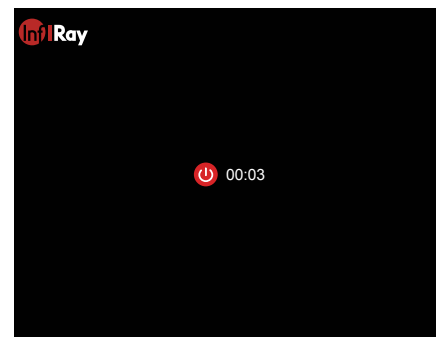
Activating Standby Mode

Standby mode may be activated to conserve battery life at any time.

1. From the home screen, short press the **Power** ⏻ **Button** to enter / exit standby mode.

Adjusting the Focus

ADJUSTING THE DIOPTER/EYEPIECE

1. Rotate the eyepiece diopter adjustment ring **(7)** at the rear of the thermal imager right or left until the user interface onscreen is clear.

2. Look closely to ensure all screen icons and the status bar appear sharp and in focus. No additional adjustments are required unless the user wishes to make changes.

NOTES:
- After the initial adjustment, there is no need to rotate the diopter adjustment ring **(7)** for long distances or other conditions.
- If necessary during standard use, you may rotate the objective lens focus knob **(2)** to adjust fine focus on the target object.

FOCUSING THE OBJECTIVE LENS

To adjust the focus on the target object:

1. Rotate the objective lens focus knob **(2)** left or right.

NOTE: Re-adjusting the focus will be necessary if the distance to your target changes.

Status Bar Overview

The status bar at the top of the screen shows information on the operating status of the ZH50 V2:

1. **Color Palette:** Shows the selected color palette, white hot ☀, black hot ☾, red hot 🔥, color ▮, red monochrome ▮, or green monochrome ▮.

2. **Ultra-clear Mode:** Shows the Ultra-clear status, on ⊙ or off ⊘.

3. **Focal Length Indicator:** Shows the focal length selected, 50mm or 25mm, as well as the direction to change the focal length.

4. **Real-Time Magnification:** Shows the real-time magnification, for the selected digital zoom level 1×, 2×, 3×, or 4×.

5. **Non-Uniformity Correction (NUC) Mode:** Shows the non-uniformity correction (NUC) ⊗ icon and selected mode, automatic **(A)** or manual **(M)**.

6. **Video Output:** The video output 📺 icon displays when video output is turned on.

7. **Wi-Fi:** Shows the Wi-Fi status, on 📶 or off 📶.

8. **Time:** Shows the current time in 24-hour format.

9. **Battery:** Shows the current battery status.

BATTERY STATUS

The battery icon color and fill level indicate the current battery status. The battery status icon is replaced by the charging icon when an external power supply is connected.

COLOR / ICON	BATTERY STATUS
Green Battery 🔋	41% – 100%
Yellow Battery 🔋	20% – 40%
Red Battery 🔋	<20%; charge the battery pack right away.
Charging Battery 🔌	The battery pack is charging; an external power supply or computer is connected via the data cable.

Using the Quick Menu

In the quick menu, the color palette, image brightness, image sharpness, and image contrast may quickly be adjusted.


1. On the home screen, short press the **Menu** Ⓜ **Button** to enter the quick menu.

2. Press the **Up** ▲ or **Down** ▼ **Button** to adjust the quick menu options, described below. The selected menu item is back-highlighted blue.

   a. 🎨 **(Color Palette):** Short press the **Menu** Ⓜ **Button** to change the color palette to white hot, black hot, red hot, color, red monochrome, or green monochrome.

   b. ☀ **(Image Brightness):** Short press the **Menu** Ⓜ **Button** to change the image brightness level, from 1–5.

   c. ▲ **(Image Sharpness):** Short press the **Menu** Ⓜ **Button** to change the image sharpness level, from 1–5.

   d. ◐ **(Image Contrast):** Short press the **Menu** Ⓜ **Button** to change the image contrast level, from 1–5.

3. Long press the **Menu** Ⓜ **Button** to save any changes and return to the home screen.

NOTE: In the quick menu, if there is no user input for 5 seconds, the ZH50 V2 will automatically save any changes and return to the home screen.

Navigating the Main Menu

From the home screen, long press the **Menu** M **Button** to enter the main menu.
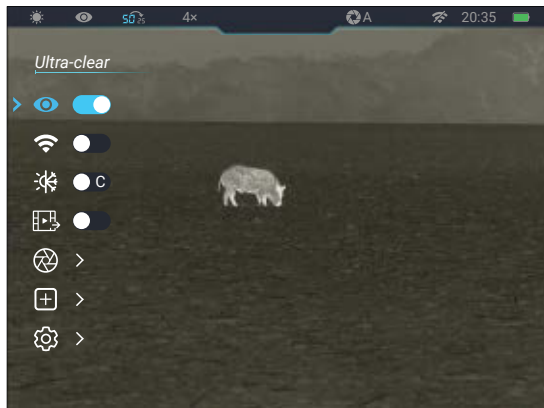
In all menu interfaces:

- Short press the **Up** ▲ or **Down** ▼ **Button** to move up and down through the menu options.
- A blue cursor indicates the current position in the menu.
- Short press the **Menu** M **Button** to:
    - Change the parameters for the selected menu option; **OR**
    - Enter the submenu; **OR**
    - Confirm submenu changes and return to the previous menu.
- Long press the **Menu** M **Button** to confirm any changes and exit to the home screen.
- Short press the **Power** ⏻ **Button** to return to the previous menu without saving.
- After 15 seconds of inactivity, the menu will automatically close and the system will return to the home screen. Changes are not saved automatically (except changes to toggle on / off menu items, such as Ultra-clear and Wi-Fi).

14. NON-UNIFORMITY CORRECTION

A non-uniformity correction (NUC) allows a thermal imager's sensors to correct its pixels and eliminate any image defects caused by pixel drift. A NUC will be performed automatically each time the ZH50 V2 is powered on.

The ZH50 V2 can perform two types of non-uniformity corrections, shuttered and shutterless. Non-uniformity corrections may be set to be performed automatically or may be performed manually at the user's discretion. For instructions on setting the NUC mode, automatic (**A**) or manual (**M**), in the main menu, see **Main Menu** > **Calibration** on page 26.

Automatic Mode

In automatic mode **(A)**, the ZH50 V2 will perform a shuttered NUC automatically according to the internal software algorithm. There is no need to close the objective lens cap **(1)** as the ZH50 V2's internal shutter covers the sensor.

> **NOTE:** A manual NUC (see below) may be performed at any time while in Automatic **(A)** mode.

Manual Mode

In manual mode **(M)**, the user independently determines the need to perform a shuttered or shutterless NUC based on the quality of the observed image.

Performing a Shuttered NUC

A shuttered NUC may be performed while in manual or automatic mode. It is not necessary to close the objective lens cap (1) during a shuttered NUC, as the internal shutter covers the sensor.

1. From the home screen, short press the **Up** ▲ and **Down** ▼ **Buttons** at the same time.
2. The internal shutter will cover the sensor and a shuttered non-uniformity correction (NUC) will be performed instantly.

Performing a Shutterless NUC

The user may perform a shutterless NUC based on the quality of the observed image. A shutterless NUC uses less power than an a shuttered NUC because it does not use the imager shutter to cover the sensor; instead, the user must close the lens cap **(1)**.

A shutterless NUC may be performed while in manual or automatic mode:

1. Close the objective lens cap **(1)**.
2. From the home screen, long press the **Up** ▲ and **Down** ▼ **Buttons** at the same time.
3. A prompt to close the lens cap **(1)** appears onscreen. The shutterless NUC starts after about 2 seconds.

NOTE: If the lens is not properly covered, a temporary "image burn" will remain in the image until the next non-uniformity correction. This "image burn" is temporary and is not a defect or sign of permanent damage.

15. PHOTOGRAPHY AND VIDEO RECORDING

The ZOOM ZH50 V2 is equipped with video recording and image capture. All videos and photos are automatically saved to the ZH50 V2's built-in 32 GB memory storage.

> **NOTE:** Photo and video files are named with the time and date; therefore, it is recommended to set the date and time before using the photo and video functions. See **Settings Menu** > **Date** and **Settings Menu** > **Time** on page 28. Alternatively, the date and time may be synchronized in the InfiRay Outdoor App. See **Using the InfiRay Outdoor App** on page 20.

Photography 📷

To take a photo:

1. From the home screen, short press the **Down** ▼ **Button**.
2. The camera 📷 icon appears briefly in the upper-left corner of the screen as the photo is taken.

> **NOTE:** A red warning icon ⊘ appears in the upper-left corner of the screen when insufficient memory storage is available. Transfer video and image files to other storage media to free up space on the memory card.

Video Recording 📹

To record video:

1. From the home screen, long press the **Down** ▼ **Button** to start a video recording.
2. When the video recording starts, the video recording 📹 icon and recording timer, in HH:MM:SS (hour: minute: second) format, appear in the upper-left corner of the screen.
3. When recording, short press the **Down** ▼ **Button** to take a photo.
4. Long press the **Down** ▼ **Button** to stop and save the video recording.

Video and Photography Notes

- You may enter and navigate the menu during video recording.
- Recorded photos are saved to the internal memory card.
    - Photos are saved in PIC_HHmmss.jpg format.
    - Videos are saved in VIDEO_HHmmss.mp4 format.
    - HHmmss is hour/minute/second.
- The maximum duration of a recorded video file is 30 minutes. After this time, video recording will begin a new file automatically.
- The number of recorded files is limited only by the capacity of the internal memory.
- Check the available space on the internal storage card regularly and move video footage and images to other storage media to free up space on the memory card.

16. ACCESSING THE INTERNAL MEMORY

When the ZOOM ZH50 V2 is turned on and connected to a computer via the included data cable, it is recognized by the computer as a flash memory (USB) drive. This allows the user to access the saved multimedia files and copy or delete any desired files.

To access the internal memory:

1. Turn on the ZH50 V2.
2. Connect the smaller USB-C end of the data cable to the USB-C port **(14)**.
3. Connect the larger USB end of the data cable to your computer.
4. Double-click **My Computer** on your computer desktop.
5. Double-click to open the device named **Zoom**.
6. Double-click to open the device named **Zoom_Storage** to access the built-in memory.
    a. The device shows the available space (in GB) remaining of the 32 GB of total memory storage.
    b. Recorded photos and videos are separated by date into folders.
    c. Folders are named by YYYYMMDD (year/month/day).
7. Select the desired files or folders to copy or delete.

17. VIDEO OUTPUT

The video output function enables connectivity with an external display or recording device via analog video.

To output video:

1. In the main menu, turn on video output. See **Main Menu** > **Video Output** on page 25 for instructions.

2. When video output is on, the video output 🎞 icon appears in the status bar.

3. Turn on the ZH50 V2.

4. Connect the smaller USB-C end of the data cable to the USB-C port **(14)**.

5. Connect the RCA connector to the RCA port on the external display or recording/display device.

18. USING THE INFIRAY OUTDOOR APP

The ZOOM ZH50 V2 can be operated using the InfiRay Outdoor App when the thermal imager is connected to a smartphone or tablet via Wi-Fi.

1. Download the App for free and install it on your smartphone or tablet:

   a. Scan one of the QR codes above to download the InfiRay Outdoor App from the App Store or Google Play; **OR**

   b. Download the App from any app store.

2. Connect the ZH50 V2 to Wi-Fi:

   a. In the main menu, turn on Wi-Fi. See **Main Menu** > **Wi-Fi** on page 24 for detailed instructions.

   b. Open the App and press the **ViewFinder** 📷 **icon** on the home screen.

   c. Click the **Connect Device WiFi button**.

   d. On the mobile device, go to **Settings** > **Wi-Fi**.

   e. Select the ZH50 V2 from the list of Wi-Fi networks. It will appear in the list as "Zoom_XXXXXX", where XXXXXX is the six-digit device serial number.

   f. Enter the Wi-Fi password and tap the **Join button**. The default password is 12345678.

3. Operate the ZH50 V2 via the App:

   a. Take real-time photos and videos, with or without audio.

   b. View, share, download, and delete photos and videos taken via the App, which are saved to the mobile device.

   c. Change the Wi-Fi password and SSID.

   d. Synchronize the date and time from the mobile device.

   e. Update the ZH50 V2's firmware.

NOTE: When a factory reset is performed, the Wi-Fi SSID and password are reset to the defaults, Zoom_XXXXXX and 12345678. See **Settings Menu** > **Factory Reset** on page 31.

19. DIGITAL ZOOM

The ZOOM ZH50 V2 will quickly increase the base magnification by enlarging the image from 1 to 4 times digitally.

To adjust the digital zoom:

1. From the home screen, short press the **Up** ▲ **Button** to toggle through the digital zoom levels, 1×, 2×, 3×, and 4×. The selected zoom level is displayed in the status bar.

2. The following table lists the real-time amplification corresponding to each digital zoom level for each focal length.

FOCAL LENGTH	FOCAL LENGTH	BASE	DIGITAL ZOOM MAGNIFICATIONS			
			1×	2×	3×	4×
ZH50	25mm	2	2	4	6	8
	50mm	4	4	8	12	16

20. PICTURE IN PICTURE (PIP)

The Picture in Picture (PIP) function opens a small floating window with a magnified image view at the top of the screen. PIP allows for improved aiming while still being able to see the wide field of view in the main body of the screen.

To activate Picture in Picture mode:

1. From the home screen, long press the **Up** ▲ **Button**. A 2× zoomed image will appear at the top of the screen. Please note that the PIP image is 2× that of the total magnification shown in the status bar.

2. To exit PIP mode, long press the **Up** ▲ **Button**.

NOTE: When the image in the main body of the screen is magnified via digital zoom, the PIP image will enlarge accordingly.

21. ULTRA-CLEAR MODE

Ultra-clear mode improves the image quality in inclement weather conditions, such as rain, fog, high humidity, or high temperatures as these conditions all result in lower thermal contrast. Ultra-clear mode enhances the NETD value of the thermal sensor and improves the sensor's response rate to these challenging environment conditions.

Ultra-clear mode provides:

- Improved image quality and clarity; images are crisper and sharper.
- Increased image detail.
- Improved recognition of observed targets.

See **Main Menu** > **Ultra-clear** on page 24.

22. HOTSPOT TRACKING

The ZOOM ZH50 V2 handheld thermal imager provides a hotspot tracking function that allows you to track the hottest object in the image.

1. From the home screen, long press the **Menu** M and **Down** ▼ **Buttons** at the same time to turn the hotspot tracking function on / off.

2. Once this function is enabled, a square red cursor will appear onscreen and automatically track the hottest object.

23. STADIAMETRIC RANGEFINDER

The ZOOM ZH50 V2 is equipped with a stadiametric rangefinder which allows the user to calculate the approximate distance to an object if its size is known.

To enter the stadiametric rangefinder:

1. From the home screen, long press the **Up** ▲ and **Menu** M **Buttons** at the same time.

2. The stadiametric rangefinder interface has the following features:

    1 Stadia Lines: The two horizontal lines in the center of the screen can be adjusted to measure the size of the target object.

    2 Icons and Distances: Icons for three pre-configured prey types and their distance values will be displayed on the right side of the screen. The pre-configured objects are deer: 5.6' tall, hog: 3.0' tall, and rabbit: 7.9" tall.

3. Use the stadiametric rangefinder to calculate the approximate distance to the observed object:

    a. Expand or contract the space between the horizontal lines until they touch the top and bottom edges of the target object.

    b. Press the **Up** ▲ **Button** to expand the space between the lines.

    c. Press the **Down** ▼ **Button** to shrink the space between the lines.

4. As you adjust the space between the horizontal lines, the rangefinder distance values on the right side of the screen are automatically recalculated.

5. Long press the **Up** ▲ and **Menu** M **Buttons** at the same time to exit the stadiametric rangefinder.

NOTE: The main menu may be accessed while the stadiametric interface is open.

24. MAIN MENU OPTIONS AND DESCRIPTIONS

Menu and submenu options, from top to bottom are:

- **Main Menu:** Ultra-clear, Wi-Fi, Image Hue, Video Output, Calibration, Pixel Defect Correction, Settings.

   - **Settings Menu:** Date, Time, Language, Firmware Update, Factory Reset, Info.

Menu option details, descriptions, and navigation instructions are listed in order on the following pages.

Ultra-clear 👁

Turn Ultra-clear mode on / off

When Ultra-clear mode is turned on, the image contrast is enhanced, which is suitable for rainy, foggy, or low-contrast conditions.
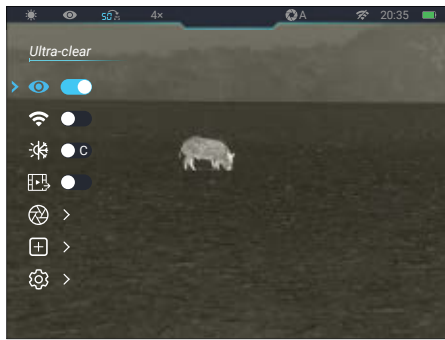
1. Long press the **Menu** Ⓜ **Button** to enter the main menu.

2. Short press the **Up** ▲ or **Down** ▼ **Button** to select the Ultra-clear 👁 menu item.

3. Short press the **Menu** Ⓜ **Button** to toggle Ultra-clear on / off. The Ultra-clear status, on 👁 or Ø appears in the status bar.

4. Long press the **Menu** Ⓜ **Button** to return to the home screen.

NOTE: When Ultra-clear mode is turned on and off, the ZH50 V2 will automatically perform a shuttered non-uniformity correction.

Wi-Fi 📶

Turn Wi-Fi on / off

Turn on Wi-Fi to manipulate the ZH50 V2 via the InfiRay Outdoor App.

1. Long press the **Menu** Ⓜ **Button** to enter the main menu.

2. Short press the **Up** ▲ or **Down** ▼ **Button** to select the Wi-Fi 📶 menu item.

3. Short press the **Menu** Ⓜ **Button** to toggle Wi-Fi on / off. The first three times Wi-Fi is turned on, the default Wi-Fi password will appear briefly to the right of the toggle.

4. The Wi-Fi status, on 📶 or off 📶 appears in the status bar.

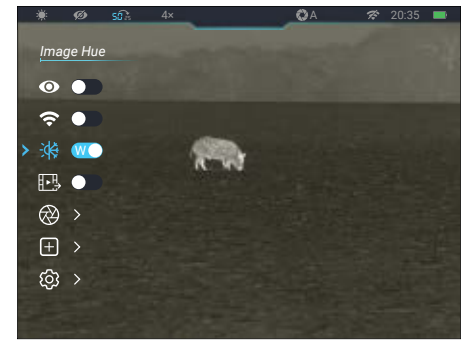5. Long press the **Menu** Ⓜ **Button** to return to the home screen.

Image Hue ⊘

Toggle between warm and cool image hue modes

1. Long press the **Menu** Ⓜ **Button** to enter the main menu.

2. Short press the **Up** ▲ or **Down** ▼ **Button** to select the image hue ⊘ menu item.

3. Short press the **Menu** Ⓜ **Button** to toggle between warm (W) and cool (C) mode.

4. Long press the **Menu** Ⓜ **Button** to return to the home screen.

NOTES:

• Cool mode provides a brighter image and warm mode provides a softer image and reduces eye strain.

• The red hot, color, green monochrome, and red monochrome color palettes do not support image hue.

Video Output 📹

Turn video output on / off

The video output function enables connectivity with an external display or recording device via analog video.

1. Long press the **Menu** Ⓜ **Button** to enter the main menu.

2. Short press the **Up** ▲ or **Down** ▼ **Button** to select the video output 📹 menu item.

3. Short press the **Menu** M **Button** to toggle video output on / off. When video output is turned on, its icon appears in the status bar.

4. Long press the **Menu** M **Button** to return to the home screen.

Calibration ⊘

Select the non-uniformity correction mode

1. Long press the **Menu** M **Button** to enter the main menu.

2. Short press the **Up** ▲ or **Down** ▼ **Button** to select the calibration ⊘ menu item.

3. Short press the **Menu** M **Button** to enter the submenu.

4. Short press the **Up** ▲ or **Down** ▼ **Button** to move through the submenu options, Automatic (A) and Manual (M). Automatic (A) is selected by default.

5. The selected NUC mode, A or M, appears in the status bar.

6. Long press the **Menu** M **Button** to return to the home screen.

Pixel Defect Correction ⊞

Select and correct defective pixels

Defective pixels are pixels that do not change correctly compared to the other image pixels—they are either brighter or darker than surrounding pixels. The ZOOM ZH50 V2 has a tool that corrects defective pixels on the sensor using its internal software.
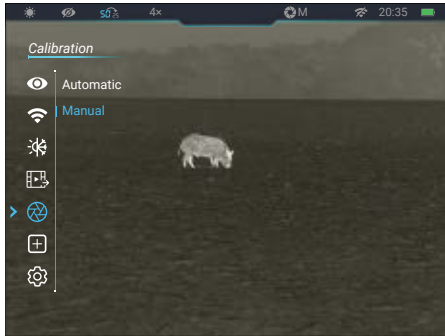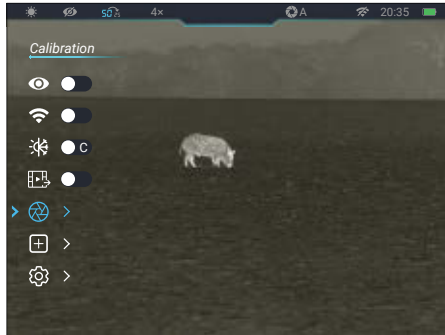
1. Long press the **Menu** M **Button** to enter the main menu.

2. Short press the **Up** ▲ or **Down** ▼ **Button** to select the pixel defect correction ⊞ menu item.

3. Short press the **Menu** M **Button** to enter the interface.

4. The pixel correction interface has the following features:

   1 Cursor: Move the cursor to the position of the defective pixel. Cursor appears in the center of the screen.

   2 X: Select to move the cursor horizontally.

   3 Y: Select to move the cursor vertically.

   4 PIP Window: Picture in Picture window appears in the lower-left corner.

   5 ⊞ 00: Shows the number of defective pixels in the "to be corrected" list.

5. Short press the **Menu** M **Button** to switch between **X** and **Y**. The X-Axis is selected by default. A blue arrow and blue text indicate the selected axis.

6. Move the cursor to the location of the defective pixel:

   a. Use the **Up** ▲ **Button** to move in the positive direction: X= Right and Y= Up.

   b. Use the **Down** ▼ **Button** to move in the negative direction: X= Left and Y= Down.

   c. Short press to move the cursor in the corresponding direction by 1 pixel; long press to move 10 pixels.

7. With the cursor in position, short press the **Power** ⏻ **Button** to add the defective pixel to the "to be corrected" list.
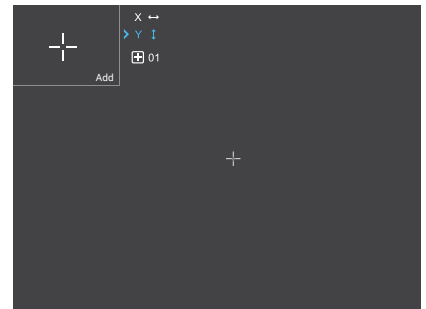
   a. **Add** will briefly appear in the bottom-right corner of the PIP window.

8. ⊞ 00 will change to ⊞ 01 to indicate that one pixel has been added to the correction list.

9. If the defective pixel has been added in error, short press the **Power** ⏻ **Button** a second time from the same X/Y coordinates (do not move the cursor) to remove the pixel from the correction list. **Del** will briefly appear in the PIP window.

10. Repeat steps 5–9 to add additional defective pixels as needed.

11. When all defective pixels have been added to the correction list, long press the **Menu** M **Button**.

12. A popup window shows the message **Do you want to keep these settings?** and two options, Yes and No. No is selected by default.

13. Short press the **Menu** M **Button** to select **No** to exit to the main menu without correcting any defective pixels; **OR**

14. Short press the **Up** ▲ or **Down** ▼ **Button** to move to **Yes** and short press the **Menu** M **Button** to correct the saved list of defective pixels and exit to the home screen.

NOTES:

- The PIP window and interface controls will move to the upper-left corner of the screen when the cursor moves into the lower-left corner.

- After 15 seconds of inactivity, the system will automatically exit the defective pixel interface.

Settings ⚙

Adjust the general settings

1. Long press the **Menu** M **Button** to enter the main menu.

2. Short press the **Up** ▲ or **Down** ▼ **Button** to select the settings ⚙ menu item.

3. Short press the **Menu** M **Button** to enter the settings submenu.
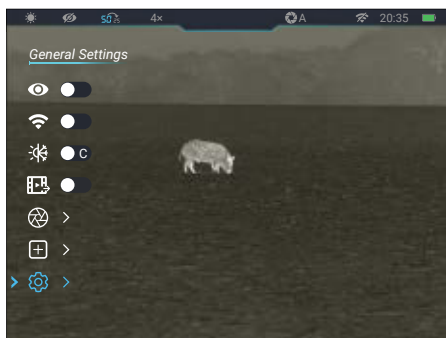
SETTINGS MENU > DATE 🗓

Set the date

1. In the settings submenu, short press the **Up** ▲ or **Down** ▼ **Button** to select the date 🗓 menu item.

2. Short press the **Menu** M **Button** to edit the date. Blue arrows will appear above and below the year digit.
The date is displayed in YYYY.MM.DD format.
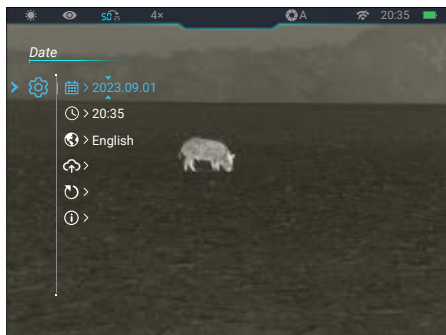
3. Short press the **Up** ▲ or **Down** ▼ **Button** to select the correct value for each digit (year, month, and day).

4. Short press the **Menu** M **Button** to switch between digits. The two blue arrows move to indicate the selected digit.

5. Long press the **Menu** M **Button** to save the date and return to the submenu.

SETTINGS MENU > TIME 🕐

Set the time

1. In the settings submenu, short press the **Up** ▲ or **Down** ▼ **Button** to select the time 🕐 menu item.

2. Short press the **Menu** M **Button** to edit the time. Blue arrows will appear above and below the hour digit.
The time is displayed in 24-hour format, HH.MM.

3. Short press the **Up** ▲ or **Down** ▼ **Button** to select the correct value for each digit (hour and minute).

4. Short press the **Menu** M **Button** to switch between digits. The two blue arrows move to indicate the selected digit.

5. Long press the **Menu** M **Button** to save the time and return to the submenu.

6. The time appears in the status bar.

SETTINGS MENU > LANGUAGE 🌍

Select the language

1. In the settings submenu, short press the **Up** ▲ or **Down** ▼ **Button** to select the language 🌍 menu item.

2. Short press the **Menu** M **Button** to enter the submenu.

3. Short press the **Up** ▲ or **Down** ▼ **Button** to move through the language options. English is selected by default.

4. Short press the **Menu** M **Button** to confirm the selection and return to the submenu.

SETTINGS MENU > FIRMWARE UPDATE ☁

Update the firmware

NOTE: Before updating, you will need to copy the downloaded firmware file to the memory storage of the ZH50 V2.

Connect the imager to a computer:

1. Turn on the ZH50 V2.

2. Connect the smaller USB-C end of the data cable to the USB-C port **(14)**.

3. Connect the larger USB end of the data cable to your computer or laptop.

4. Double-click **My Computer** on your computer desktop.

5. Double-click to open the device named **Zoom**.

6. Double-click to open the device named **Zoom_Storage** and create a new folder called **update**.

7. Copy the downloaded firmware .zip file to the **update** folder.
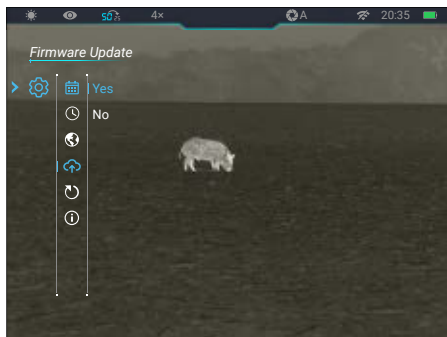
On the ZH50 V2:

1. In the settings submenu, short press the **Up** ▲ or **Down** ▼ **Button** to select the firmware update ☁ menu item.

2. Short press the **Menu** M **Button** to enter the submenu.

3. The submenu has two options, Yes and No. Yes will update the firmware and No will cancel the operation. Yes is selected by default.

4. Short press the **Menu** M **Button** to select **Yes** to confirm the firmware update. The ZH50 V2 will update and restart automatically; **OR**

5. Short press the **Up** ▲ or **Down** ▼ **Button** to move to **No** and short press the **Menu** M **Button** to confirm cancellation of the firmware update and return to the submenu.

## SETTINGS MENU > FACTORY RESET ↻

Restore factory default settings

1. In the settings submenu, short press the **Up** ▲ or **Down** ▼ **Button** to select the factory reset ↻ menu item.

2. Short press the **Menu** M **Button** to enter the submenu.

3. The submenu has two options, Yes and No. Yes will restore factory settings and No will cancel the operation. No is selected by default.

4. Short press the **Menu** M **Button** to select **No** to confirm cancellation of the factory reset and return to the submenu; **OR**

5. Short press the **Up** ▲ or **Down** ▼ **Button** to move to **Yes** and short press the **Menu** M **Button** to confirm the factory reset. The factory settings will be restored and the ZH50 V2 will reboot automatically.

NOTES:

- There is a pause of about 20 seconds before the factory restart begins. Do not press any buttons during this time.
- A factory reset cannot be undone.
- The settings listed below will be reset to the factory defaults:

  - Color Palette: White Hot
  - Image Brightness: 3
  - Image Sharpness: 3
  - Image Contrast: 2
  - Digital Zoom: 1×
  - Ultra-clear mode: Off
  - Wi-Fi: Off

  - Image Hue: Cool
  - Video Output: Off
  - Calibration Mode: A
  - Language: English
  - Wi-Fi SSID: Zoom_XXXXXX
  - Wi-Fi Password: 12345678

SETTINGS MENU > INFO ⓘ

Show device information

1. In the settings submenu, short press the **Up** ▲ or **Down** ▼ **Button** to select the info ⓘ menu item.

2. Short press the **Menu** Ⓜ **Button** to enter the submenu.

3. The info screen will show: the device model number, GUI version, SYS Info, boot version, FPGA, PN and SN number, and hardware version.

4. Long press the **Menu** Ⓜ **Button** to return to the home screen.

25. BASIC INSPECTION

It is recommended to carry out a technical inspection before each use. Please check the following:

- The appearance of the thermal imager: there should be no cracks in the body or visible damage.
- The condition of the objective lens and eyepiece: there should be no cracks, greasy spots, dirt, or other deposits on the lens.
- The rechargeable battery pack should be fully charged.
- The control buttons should be in working order.

26. BASIC MAINTENANCE

Always replace the objective lens cap **(1)** after use to avoid damaging or scratching the lens. Never touch the lens directly; oil from your skin can damage the lens coating and surface.

Basic maintenance should be carried out at least twice a year and includes the following steps:

- Wipe the surface of the external metal and plastic components with a clean, dry cotton cloth. Do not use chemical, corrosive, or abrasive cleaners. Canned air may also be used to clean the external components.
- Clean the electric contacts and battery slots on the thermal imager using a non-greasy organic solvent.
- Check the lens and eyepiece. If necessary, remove any dirt or sand from the optics; a non-contact cleaning method is preferred.
- Cleaning the exterior of the lens should only be done with the included microfiber lens cloth or a similar product. Only clean the lens when it is visibly soiled. Frequent wiping or cleaning can degrade the anti-reflective lens coating.

27. WARRANTY

At iRayUSA we're first and foremost hunters and users of our products and we understand that failure isn't an option. We also understand that having to wait extended periods for repair isn't something that a customer should have to put up with when something does go wrong. During your published warranty period, iRayUSA will repair or replace, at its discretion, any optic that becomes defective during normal use. Additionally, if we cannot fix your optic in less than one week, we will offer to replace it with a replacement product in like or better condition. If you would rather wait for your specific optic to be repaired, we can handle that too.

We know you've never seen this from a thermal manufacturer and neither have we, and that's why we started iRayUSA.

Our warranty follows the product and is not tied to the original owner. The warranty period is tied to the date of sale to the dealer. This warranty only covers normal use and does not cover cosmetic damage, normal wear, intentional damage, theft, loss, any act of God, or a condition caused by use other than intended. Any product that is modified, opened, or tampered with will void any warranty coverage. Any serial number damage or alteration on the product will be considered a modification. Be sure to register your ZOOM ZH50 V2 thermal imager at irayusa.com/register.

To return a product for repair:

1. Go to irayusa.com/warranty and click the **Request an RMA button** to request an RMA number. Returns will not be accepted without an RMA.

2. The customer is responsible for shipping the product to iRayUSA, per the instructions included in the RMA. iRayUSA will return the product at no cost.

WARRANTY NOTES:

- The one-week timeline starts from the time of receipt of the product at iRayUSA.
- iRayUSA is not liable for any damages or loss incurred when shipping to iRayUSA.
- This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Please give us a call at **800-769-7125**, visit irayusa.com/warranty, or email info@irayusa.com with any questions.

28. GENERAL TROUBLESHOOTING

The troubleshooting table below lists issues that may occur when operating the ZOOM ZH50 V2. Carry out the recommended troubleshooting steps in the order shown in the table. Please contact iRayUSA at 800-769-7125 or irayusa.com/support or an authorized vendor for assistance before attempting to perform any modifications or repairs beyond the scope of the troubleshooting procedures in this manual. Unauthorized repairs or modifications will void your warranty.

ISSUE	POSSIBLE CAUSES	TROUBLESHOOTING STEPS
The ZH50 V2 will not turn on.	The built-in battery pack is very low or has completely discharged.	Charge the built-in battery pack.
The ZH50 V2 can not connect to a computer or external power supply.	External power supply has completely discharged.	Check the external power supply and charge it if necessary.
	Computer is turned off.	Power on the computer.
	Data cable is damaged.	Replace the USB-C to analog RCA/USB data cable.
Video output is not working.	Video output is not turned on	Turn on video output in the main menu. See **Main Menu** > **Video Output** on page 25.
The ZH50 V2 can not connect to a mobile device (smartphone or tablet).	Wi-Fi is not turned on.	Turn on the Wi-Fi in the main menu. See **Main Menu** > **Wi-Fi** on page 24.
	Wrong Wi-Fi password entered.	On the mobile device, go to **Settings** > **Wi-Fi** and enter the correct password. The default password is 12345678. See **Main Menu** > **Wi-Fi** on page 24.
	Too many Wi-Fi signals near the ZH50 V2.	Move the ZH50 V2 and mobile device to an area with no or fewer Wi-Fi signals.
Wi-Fi signal is lost or interrupted.	Smartphone or tablet is out of range of a strong Wi-Fi signal, or there are obstacles between the ZH50 V2 and the mobile device.	• Try again when the Wi-Fi signal is stable. • Relocate the ZH50 V2 closer to the Wi-Fi signal.
The image is fuzzy, unclear, not balanced, or has artifacts.	Non-uniformity correction is required.	Perform a non-uniformity correction. See **Non-uniformity Correction** on page 16 and **Main Menu** > **Calibration** on page 26.
The image is too dark.	Display brightness level is too low.	Adjust the display brightness in the quick menu. See **Using the Quick Menu** on page 15.
The GUI is clear, but the image is fuzzy.	The lens is not focused.	• Adjust the focus on the target by rotating the Objective Focus Knob **(2)**. • Adjust the image sharpness in the quick menu. See **Using the Quick Menu** on page 15.
	There is dust on the internal or external optical surfaces of the lens.	• Wipe the external optical surface with the included microfiber lens cloth.
	There is condensation on the internal or external optical surfaces of the lens.	• Wipe the external optical surface with the included microfiber lens cloth. • Allow the ZH50 V2 to dry by leaving it in a warm, dry environment for at least 4 hours.
The image of the object being observed is missing.	Looking through glass.	Remove any glass windows from the field of view.
The ZH50 V2 will not focus.	Image settings are not optimal for the current environmental conditions or the object being observed.	• Check the outer surfaces of the objective lenses and eyepiece and, where necessary, wipe away any dust, condensation, frost, etc. • In cold weather, you can use special anti-fogging coatings, such as those made for corrective glasses. • Adjust the focus on the target by rotating the Objective Focus Knob **(2)**. • Adjust the image sharpness in the quick menu. See **Using the Quick Menu** on page 15. • Adjust the image and device settings. See **Quick Start Guide** on page 8. • Turn on Ultra-clear mode. See **Main Menu** > **Ultra-clear** on page 24.

ISSUE	POSSIBLE CAUSES
Image quality is too low or the detection range is reduced.	These issues may occur due to the weather conditions, such as snow, rain, humidity, and fog.
When the ZH50 V2 is used in low-temperature conditions, the image quality of the surroundings is worse than in warm-temperature conditions.	Environmental conditions.

TROUBLESHOOTING STEPS

Turn on Ultra-clear mode. See **Main Menu** > **Ultra-clear** on page 24.

In warm-temperature conditions, objects being observed (surroundings and background) heat up differently because of thermal conductivity, thereby generating a high-temperature contrast. Accordingly, the image quality produced by the thermal imager will be higher. In low-temperature conditions, the background will cool down to roughly the same temperature, and thus the temperature contrast is substantially reduced and image detail can go down as there is less contrast in the scene. This is a normal function of a thermal imager and is no indicator of actual detector performance.

29. NOTES

IRAY USA