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OWON HDS2202S

OWON HDS2202S 3-in-1 Portable Digital Oscilloscope Multimeter User Manual

Model: HDS2202S

1. Introduction

Thank you for choosing the OWON HDS2202S, a versatile 3-in-1 portable instrument that combines a digital oscilloscope, a multimeter, and a waveform generator. This device is designed for professionals and enthusiasts requiring precise measurements and signal generation in a compact, handheld form factor. This manual provides essential information for safe and effective operation, setup, maintenance, and troubleshooting.



Figure 1: OWON HDS2202S highlighting its three core functions: Oscilloscope, Multimeter, and Waveform Generator.

2. Safety Information

Please read the following safety precautions carefully to avoid personal injury and prevent damage to the instrument or any products connected to it. Use the instrument only as specified in this manual.

- **Ground the Product:** Ensure proper grounding when connecting to power sources.
- **Observe All Terminal Ratings:** To prevent fire or shock hazard, observe all ratings and markings on the product.
- **Do Not Operate in Wet/Damp Conditions:** Do not operate the instrument in wet or damp environments.
- **Do Not Operate in Explosive Atmosphere:** Do not operate the instrument in an atmosphere containing explosive gases or fumes.
- **Keep Product Surfaces Clean and Dry:** Keep the instrument's surfaces clean and dry to prevent contamination.
- **Use Proper Power Cord:** Use only the power cord specified for this product and certified for the country of use.
- **Use Proper Fuses:** Use only the specified type and rating of fuse for this instrument.
- **Do Not Operate with Suspected Failures:** If you suspect damage to the instrument, have it inspected by qualified service personnel.

3. Package Contents

Verify that all items listed below are included in your package. If any items are missing or damaged, please contact your dealer.



Figure 2: All items included in the OWON HDS2202S product box.

- OWON HDS2202S Main Device
- Soft Carrying Bag
- Oscilloscope Probe(s)
- Probe Adjustment Tool
- USB Type-C Cable
- Multimeter Test Leads (Red and Black)

- Quick Start Guide / User Manual
- BNC to Alligator Clip Cable(s)

4. Product Overview

4.1 Front Panel and Controls

The front panel features a high-resolution LCD screen and various buttons for controlling the device's functions. Familiarize yourself with the layout for efficient operation.



Figure 3: Front panel layout and key controls of the HDS2202S.

- **3.5-inch TFT Color LCD Screen:** Displays waveforms, measurement data, and menu options.
- **Function Keys (F1-F4):** Context-sensitive keys for menu navigation.
- **Mode Button:** Switches between Oscilloscope, Multimeter, and Waveform Generator modes.
- **CH1/2 Button:** Toggles between Channel 1 and Channel 2 in oscilloscope mode.
- **HOR Button:** Adjusts horizontal time base.
- **System Button:** Accesses system settings.
- **Save Button:** Saves waveforms or settings.
- **Navigation Keys (Up/Down/Left/Right/OK):** For menu navigation and parameter adjustment.
- **Auto Button:** Automatically sets oscilloscope parameters for stable waveform display.
- **Trig/Δ Button:** Accesses trigger menu (oscilloscope) or relative value measurement (multimeter).
- **Run/Stop Button:** Starts or stops waveform acquisition.
- **Power Button:** Turns the device on or off.
- **Multimeter Input Connectors (A, mA, COM, VΩ+C):** For connecting multimeter test leads.

4.2 Top and Side Panels

The top and side panels house the oscilloscope inputs, waveform generator output, and communication/charging port.

Figure 4: Top panel with CH1 and CH2 oscilloscope inputs.

Figure 5: Side panel with USB Type-C port for charging/communication and 3.3V/1kHz calibration signal output.

- **Oscilloscope Inputs (CH1, CH2):** BNC connectors for connecting oscilloscope probes.
- **Waveform Generator Output (GEN OUT):** BNC connector for outputting generated waveforms.
- **USB Type-C Interface:** For charging the internal battery and data communication with a computer.
- **Calibration Signal Output:** Provides a 3.3V/1kHz square wave for probe compensation and testing.

5. Setup

5.1 Battery Installation and Charging

The HDS2202S is powered by a 4400mAh lithium battery, providing approximately 6 hours of continuous operation. The battery is user-replaceable.



Figure 6: Battery compartment with two 18650 lithium-ion batteries.

1. **Battery Installation:** Open the battery compartment cover on the rear of the device. Insert the two 18650 lithium-ion batteries, ensuring correct polarity. Close the cover securely.
2. **Charging:** Connect the device to a USB power adapter (not included) or a computer's USB port using the provided USB Type-C cable. The charging indicator on the device will show charging status. A full charge typically takes several hours.
3. **Power On/Off:** Press and hold the **Power** button for a few seconds to turn the device on or off.

5.2 Probe Compensation (Oscilloscope)

Before taking accurate measurements with the oscilloscope, it is essential to compensate the probes. This ensures the probe accurately transmits the signal to the oscilloscope.

1. Connect the oscilloscope probe to CH1 input.
2. Connect the probe tip to the calibration signal output (3.3V/1kHz square wave) on the side of the device.
3. Attach the probe ground clip to the ground terminal next to the calibration output.
4. Press the **Auto** button to display the square wave.
5. Using the probe adjustment tool (small screwdriver), adjust the trimmer on the probe until the corners of the square wave are sharp and flat, with no overshoot or undershoot.

6. Operating Instructions

6.1 Oscilloscope Mode

The HDS2202S features a dual-channel oscilloscope with a 200 MHz bandwidth and 1 GSa/s real-time sample rate.



Figure 7: Example display in Oscilloscope mode.

1. **Entering Oscilloscope Mode:** Press the **Mode** button until the oscilloscope interface is displayed.
2. **Connecting Probes:** Connect oscilloscope probes to CH1 and/or CH2 inputs.
3. **Auto Setup:** For quick waveform display, press the **Auto** button. The device will automatically adjust vertical and horizontal settings.
4. **Vertical Control:** Use the navigation keys to adjust vertical scale (Volts/Div) and position for each channel (selected via **CH1/2** button).
5. **Horizontal Control:** Use the **HOR** button and navigation keys to adjust the horizontal time base (Sec/Div) and position.
6. **Trigger Settings:** Press the **Trig/Δ** button to access trigger menu. Adjust trigger level, mode (Edge, Pulse, Video), and source.
7. **Measurements:** The device supports automatic measurements (e.g., Vpp, Vmax, Freq) and cursor measurements. Access these via menu options.
8. **Run/Stop:** Press the **Run/Stop** button to pause or resume waveform acquisition.

6.2 Multimeter Mode

The integrated multimeter offers 20000 counts with True RMS measurement capabilities.

1. **Entering Multimeter Mode:** Press the **Mode** button until the multimeter interface is displayed.
2. **Connecting Test Leads:** Connect the red test lead to the VΩ+C terminal and the black test lead to the COM terminal for voltage, resistance, capacitance, and diode measurements. For current measurements, connect the red lead to A or mA terminal as appropriate.
3. **Function Selection:** Use the navigation keys to select the desired measurement function (DCV, ACV, DCA, ACA, Resistance, Capacitance, Diode Test, Continuity).
4. **Relative Measurement:** Press the **Trig/Δ** button to activate relative measurement mode, useful for zeroing out lead resistance or comparing values.
5. **Hold Function:** Press a function key (e.g., F1) to hold the current reading on the display.

6.3 Waveform Generator Mode

The HDS2202S can generate various standard and arbitrary waveforms.



Figure 8: Waveform Generator function icon.

1. **Entering Waveform Generator Mode:** Press the **Mode** button until the waveform generator interface is displayed.
2. **Connecting Output:** Connect a BNC cable from the GEN OUT port to the device or circuit you wish to test.
3. **Waveform Selection:** Use the navigation keys and function keys to select the desired waveform type (Sine, Square, Triangle, Pulse, Ramp, Noise, DC, or one of the 8 built-in arbitrary waveforms like Sinc, Bessel, StairUpDown).
4. **Parameter Adjustment:** Adjust parameters such as frequency, amplitude, offset, and duty cycle using the navigation keys.
5. **Output On/Off:** Use a function key to enable or disable the waveform output.

7. Maintenance

7.1 Cleaning

- Clean the instrument's exterior surfaces with a soft cloth dampened with mild detergent and water. Do not use abrasive cleaners or solvents.
- Ensure the instrument is powered off and disconnected from all power sources before cleaning.
- Avoid getting moisture into any openings.

7.2 Battery Care

- To prolong battery life, avoid fully discharging the battery frequently.
- If storing the device for an extended period, charge the battery to about 50% and store in a cool, dry place.
- Replace batteries when their performance significantly degrades. Use only specified 18650 lithium-ion batteries.

8. Troubleshooting

Problem	Possible Cause	Solution
Device does not power on.	Battery is depleted or not installed correctly.	Charge the battery or ensure it is installed with correct polarity.
No waveform displayed in oscilloscope mode.	Probe not connected, signal too small/large, incorrect trigger settings.	Check probe connection, press **Auto** button, adjust vertical/horizontal scales, check trigger level.
Multimeter shows "OL" or incorrect readings.	Test leads not connected properly, out of range, or incorrect function selected.	Ensure leads are firmly connected, select appropriate range/function, check circuit.
Screen is dim or flickering.	Low battery or backlight setting.	Charge the battery. Adjust backlight brightness in System Settings.

9. Specifications

Below are the key technical specifications for the OWON HDS2202S.

Feature	Specification
Oscilloscope	
Bandwidth	200 MHz
Channels	2
Sample Rate	1 GSa/s (Real-time)
Record Length	8K
Waveform Refresh Rate	10,000 wfrms/s
Vertical Resolution	8-bit
Vertical Sensitivity	10mV/div - 10V/div
Multimeter	
Display Counts	20,000 counts
Measurement Functions	DC/AC Voltage, DC/AC Current, Resistance, Capacitance, Diode, Continuity
True RMS	Yes
Waveform Generator	
Waveforms	Sine, Square, Triangle, Pulse, Ramp, Noise, DC, 8 Arbitrary Waveforms
General	
Display	3.5-inch TFT LCD (320x240)
Power Source	4400 mAh Lithium Battery
Battery Life	Approx. 6 hours
Power Consumption	< 3W
Dimensions	21.5 x 15.5 x 6 cm (8.5 x 6.1 x 2.4 inches)
Weight	Approx. 1 kg (2.2 lbs)
Interface	USB Type-C



Figure 9: OWON HDS2202S dimensions.

10. Warranty and Support

OWON products are designed and manufactured to the highest quality standards. For warranty information and technical support, please refer to the warranty card included with your product or visit the official OWON website. Please retain your proof of purchase for warranty claims.

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