MakerHawk DSO3D12

MakerHawk LCD Handheld Digital Oscilloscope Kit User Manual

Model: DSO3D12

1. Introduction

Thank you for choosing the MakerHawk LCD Handheld Digital Oscilloscope Kit. This device integrates a 2-channel digital oscilloscope, a true RMS multimeter, and a DDS function signal generator into a compact, portable unit. Designed for electronics enthusiasts, engineers, and technicians, it offers a 120MHz bandwidth and 250MSa/s real-time sampling rate for precise measurements. This manual provides essential information for safe and effective operation, setup, maintenance, and troubleshooting.

2. Safety Information

Please read and understand all safety instructions before using the device. Failure to follow these instructions may result in electric shock, fire, or damage to the device.

- Do not operate the device in wet or damp conditions.
- Ensure proper grounding when connecting to external circuits.
- Do not exceed the maximum input voltage ratings specified in the technical specifications.
- Use only the probes and accessories provided or approved by MakerHawk.
- Avoid touching exposed connections or components while the device is powered on.
- Do not attempt to open or modify the device. Refer all servicing to qualified personnel.
- When measuring high-voltage or non-isolated circuits, do not use the multimeter while charging (powered by the built-in battery).

3. Package Contents

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

- 1x MakerHawk Digital Oscilloscope (DSO3D12)
- 2x Oscilloscope Probes (1X/10X)
- 2x Multimeter Probes (Red, Black)
- 2x Gray Probe Hooks (including ground alligator clamp)
- 1x Compensating Adjusting Rod
- 2x Insulation Protective Caps
- 8x Identification Rings
- 1x USB Type-C Charging Cable
- 1x User Manual

Figure 3.1: Contents of the MakerHawk Digital Oscilloscope Kit.

4. Product Overview

The MakerHawk DSO3D12 is a versatile 3-in-1 device combining the functionalities of a digital oscilloscope, a multimeter, and a signal generator. Its compact design and robust features make it suitable for various electronic testing and diagnostic

tasks.

Figure 4.1: The 3-in-1 functionality of the MakerHawk Digital Oscilloscope.

Key Features:

- **Professional Design:** 2-channel input oscilloscope with up to 120MHz bandwidth and 250MSa/s real-time sampling rate.
- **Integrated Signal Generator:** Built-in DDS function signal generator capable of outputting sine, square, and triangle waves with adjustable frequency (0-2MHz) and amplitude (2.5V).
- **High-Precision Multimeter:** Features a true RMS multimeter with fast software calibration, allowing simultaneous use with the oscilloscope for low voltage/resistance/continuity measurements.
- **Portable and Durable:** Compact design with a 3.2-inch LCD backlight display. Includes a built-in 2500mAh lithium battery for up to 4-6 hours of continuous use and a high-voltage protection module (up to 400V).
- **Flexible Trigger Modes:** Supports Auto, Normal, and Single trigger modes, with settings for time base, amplitude, and trigger slope. One-touch AUTO function for automatic screen adaptation.

Figure 4.2: Device features including battery, display, and safety.

5. Setup

5.1 Charging the Device

The device is equipped with a built-in 2500mAh lithium battery. Before first use, fully charge the device using the provided USB Type-C cable and a standard 5V USB power adapter.

- Connect the USB Type-C cable to the device's charging port and the other end to a 5V USB power source.
- The charging indicator light will be red while charging.
- Charging is complete when the indicator light turns green. A full charge typically takes over 4 hours at a charging current of approximately 700mA (3.5W).
- Avoid using the multimeter functions while the device is charging, especially when measuring high-voltage or non-isolated circuits.

5.2 Connecting Probes

Properly connecting the probes is crucial for accurate measurements.

- **Oscilloscope Probes:** Connect the BNC connectors of the oscilloscope probes to the CH1 and CH2 inputs on the top of the device. Ensure a secure connection by twisting the connector clockwise.
- **Multimeter Probes:** Insert the red multimeter probe into the 'VΩ' jack and the black probe into the 'COM' jack for voltage and resistance measurements. For current measurements, use the '10A' or '600mA' jacks as appropriate.
- **Probe Compensation:** For oscilloscope probes, it is recommended to perform probe compensation to ensure accurate waveform display. Connect the probe to a known square wave source (e.g., the device's built-in signal generator or a dedicated probe compensation output) and adjust the trimmer on the probe until the square wave appears flat-topped without overshoot or undershoot.

6. Operating Instructions

6.1 General Interface

The device features a 3.2-inch LCD display and a combination of soft silicone keys for navigation and function selection. The main screen displays waveform data, measurement parameters, and menu options.

6.2 Oscilloscope Mode

To enter Oscilloscope mode, ensure the device is powered on. The default display typically shows the waveform. Use the navigation buttons to adjust settings.

Basic Measurements

- **Vertical Scale (mV/div):** Adjusts the voltage sensitivity. Use the 'CH1' and 'CH2' buttons to select the channel and then the 'mV' or 'V' buttons to change the scale.
- **Horizontal Scale (Time Base):** Adjusts the time per division. Use the 'Time base' button and navigation keys to change the sweep speed.
- **Position:** Adjusts the vertical or horizontal position of the waveform on the screen.
- **AUTO Button:** Pressing the 'AUTO' button automatically adjusts the vertical and horizontal scales and trigger settings to display a stable waveform.
- **Measurement Functions:** The device supports 14 types of automatic measurement functions, including Frequency, Peak-to-Peak Voltage (PKPK), Mean Voltage (Mean), RMS, Max, Min, Period, Duty Cycle, etc. These are typically displayed on the screen or accessible via a 'Meas' menu.

Trigger Modes

The device offers three trigger modes to stabilize repetitive waveforms and capture single-shot events.

- **Auto Trigger:** The oscilloscope triggers automatically even without a stable signal, ensuring a waveform is always displayed.
- **Normal Trigger:** The oscilloscope triggers only when the input signal meets the specified trigger conditions (level, slope). If no trigger condition is met, the display remains unchanged.
- **Single Trigger:** The oscilloscope waits for a single trigger event, captures the waveform, and then stops. This is useful for capturing non-repetitive or transient events.
- **Trigger Level and Slope:** Adjust the trigger level to specify the voltage point at which the trigger occurs. Select the trigger slope (rising edge or falling edge) to define the direction of the voltage change that initiates the trigger.

XY Mode

XY mode displays the voltage of channel 1 (CH1) on the horizontal axis and the voltage of channel 2 (CH2) on the vertical axis. This mode is useful for observing phase relationships between two signals, often resulting in Lissajous figures.

FFT Spectrum

The Fast Fourier Transform (FFT) function converts time-domain waveforms into the frequency domain, allowing analysis of the frequency components within a signal. This is useful for identifying harmonics, noise, and signal integrity issues.

Reference Waveform

This feature allows you to save a waveform and display it as a reference against a live waveform. This is useful for comparing current measurements with a known good signal or for analyzing changes over time.

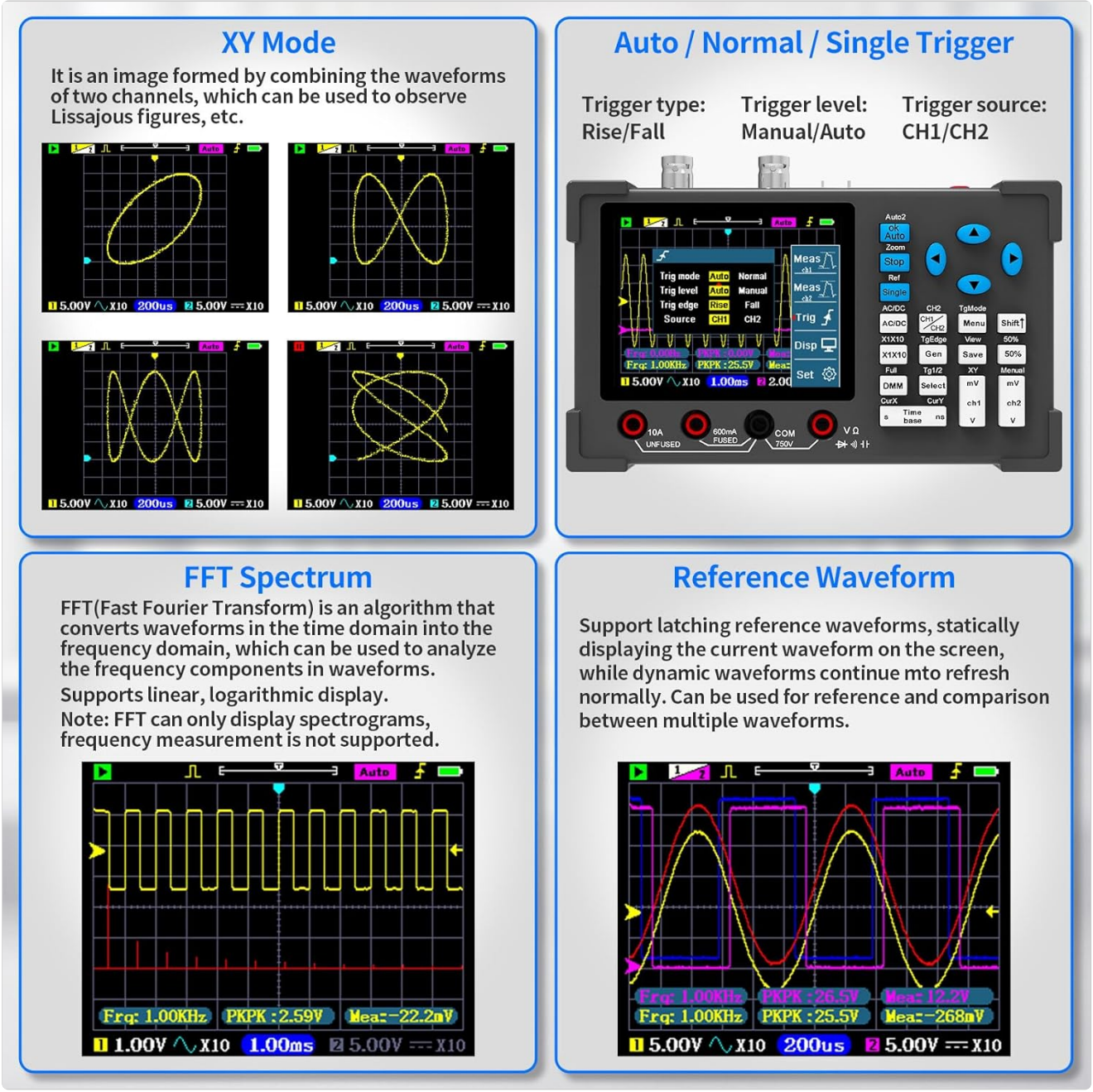


Figure 6.1: Advanced Oscilloscope Functions.

6.3 Multimeter Mode

The built-in true RMS multimeter supports various measurements. When in oscilloscope mode, a small multimeter window can be displayed in the upper right corner. For full-screen multimeter operation, select the dedicated multimeter mode.

Figure 6.2: High-precision Multimeter Function.

- **Voltage Measurement:** Connect probes to 'VΩ' and 'COM' for DC or AC voltage.
- **Resistance Measurement:** Connect probes to 'VΩ' and 'COM' for resistance.
- **Continuity Test:** Connect probes to 'VΩ' and 'COM' for continuity.
- **Current Measurement:** Connect the red probe to '10A' or '600mA' and the black probe to 'COM' for current measurements. Ensure the correct jack is used to avoid damaging the device.

6.4 Signal Generator Mode

The integrated DDS function signal generator can output various waveforms for testing and calibration purposes.

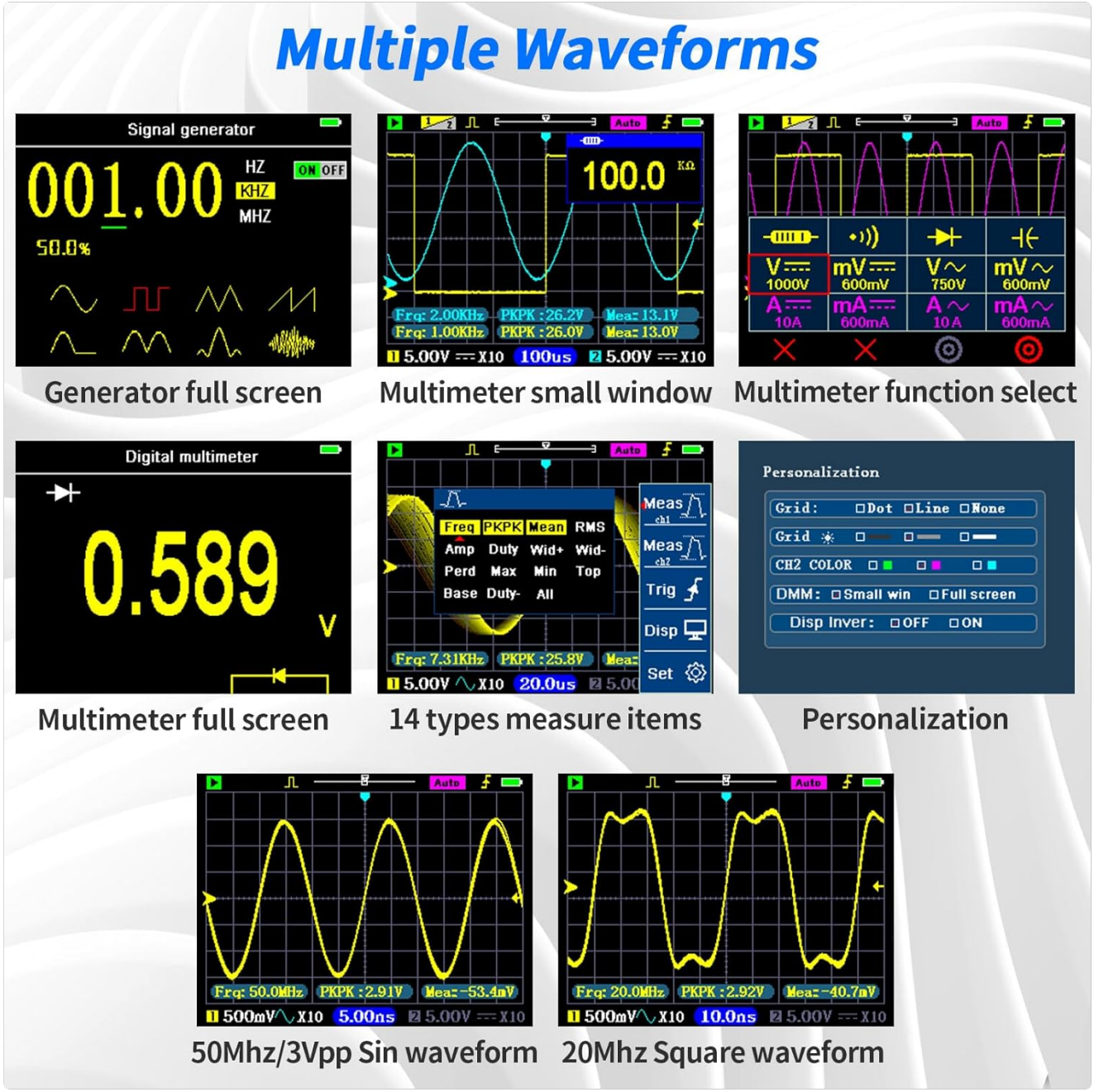


Figure 6.3: Multiple Waveforms and Signal Generator Interface.

- **Waveform Types:** Select between sine wave, square wave, and triangle wave outputs.
- **Frequency Adjustment:** Adjust the output frequency from 0 to 2MHz.
- **Amplitude:** The voltage amplitude is fixed at 2.5V.
- **Duty Cycle:** For square waves, the duty cycle is adjustable from 1% to 99%.

7. Maintenance

- **Cleaning:** Use a soft, dry cloth to clean the device. Do not use abrasive cleaners or solvents.
- **Storage:** Store the device in a cool, dry place away from direct sunlight and extreme temperatures.
- **Battery Care:** To prolong battery life, avoid fully discharging the battery frequently. If storing for an extended period, charge the battery to approximately 50% and recharge every few months.
- **Probe Care:** Inspect probes regularly for damage. Replace worn or damaged probes immediately to ensure safety and accuracy.

8. Troubleshooting

Problem	Possible Cause	Solution
Device does not power on	Low battery; Power button not pressed correctly; Device fault	Charge the device fully; Press and hold the power button; Contact customer support if issue persists.
No waveform displayed	Probe not connected; Incorrect input settings; Trigger not set correctly; Signal too small or too large	Ensure probes are securely connected; Press 'AUTO' button; Adjust vertical scale (mV/div) and horizontal scale (Time Base); Check trigger mode and level.
Unstable waveform	Incorrect trigger settings; Noisy signal	Adjust trigger level and slope; Change trigger mode to 'Normal' or 'Single'; Check for external noise sources.
Inaccurate measurements	Uncompensated probe; Incorrect probe attenuation setting; Device not calibrated	Perform probe compensation; Ensure probe attenuation (1X/10X) matches the device setting; Contact customer support for calibration if suspected.
Multimeter readings are incorrect	Incorrect probe connection; Wrong measurement range selected; Device fault	Ensure probes are in the correct jacks ('VΩ', 'COM', '10A', '600mA'); Select the appropriate measurement function (voltage, resistance, current); Contact customer support.

9. Technical Specifications

The following table outlines the key technical specifications of the MakerHawk DSO3D12.

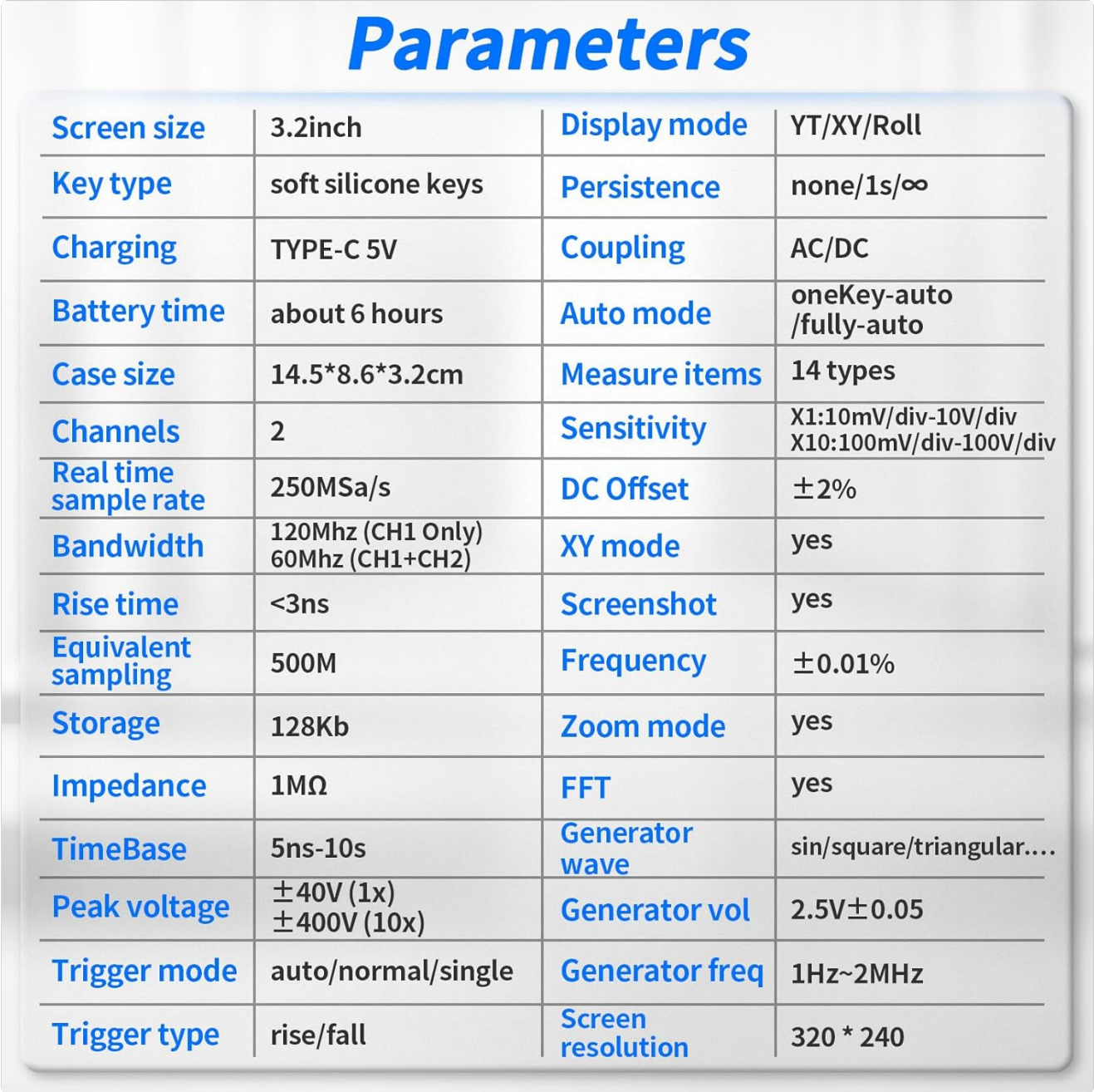


Figure 9.1: Detailed Technical Parameters.

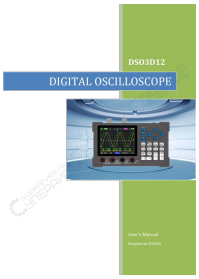
Parameter	Value
Product Dimensions	5.71 x 3.39 x 1.26 inches; 1.3 Pounds
Batteries	1 A batteries required (included) - 2500mAh Lithium
Power Source	Battery Powered (USB Type-C 5V Charging)
Channels	2
Bandwidth	120MHz (CH1 Only), 60MHz (CH1+CH2)
Real-time Sampling Rate	250MSa/s
Equivalent Sampling Rate	500MSa/s
Screen Size	3.2-inch TFT LCD

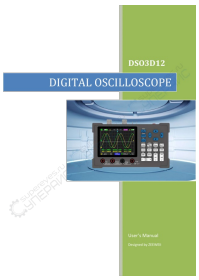
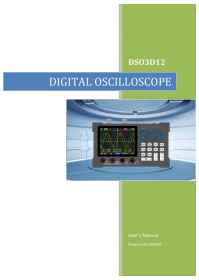
Parameter	Value
Minimum Range	10mV/div
Max Input Voltage	400V (Peak)
Signal Generator Output	Sine, Square, Triangle (0-2MHz, 2.5V Amplitude)
Multimeter Type	True RMS
Trigger Modes	Auto, Normal, Single
Color	Black, White, or Gray

10. Warranty and Support

MakerHawk products are designed for reliability and performance. This device comes with a standard manufacturer's warranty against defects in materials and workmanship. For specific warranty details, please refer to the warranty card included with your product or visit the official MakerHawk website.
For technical support, troubleshooting assistance, or to inquire about replacement parts, please contact MakerHawk customer service through the contact information provided on our website or your purchase platform. Please have your product model number (DSO3D12) and purchase date ready when contacting support.

Related Documents - DSO3D12

	MakerHawk Type-C Tester User Guide: Features and Instructions Comprehensive guide to the MakerHawk Type-C Tester, detailing its display panel functions, specifications, and operational instructions for voltage, current, power, and capacity measurements.
	Wireless Bluetooth Lapel Microphone: Operating Instructions & Specifications This document provides operating instructions and technical specifications for the MakerHawk Wireless Bluetooth Lapel Microphone (Model N100). It details setup, button functions, usage methods, prompt tones, indicator states, and product parameters for wireless audio recording.
	ZEEWEII DSO3D12 Digital Oscilloscope User's Manual Comprehensive user's manual for the ZEEWEII DSO3D12 Digital Oscilloscope, detailing its features, operation, safety guidelines, button functions, menu system, probe calibration, and measurement capabilities.

	[DSO3D12 Digital Oscilloscope User Manual - ZEEWEII] Comprehensive user manual for the ZEEWEII DSO3D12 Digital Oscilloscope, covering operation, features, settings, probes, and troubleshooting. Learn how to use your digital oscilloscope effectively.
	[ZEEWEII DSO3D12 Digital Oscilloscope User Manual] The ZEEWEII DSO3D12 Digital Oscilloscope is a versatile, portable instrument combining a digital oscilloscope, multimeter, and signal generator. This user manual provides comprehensive instructions for operation, calibration, and troubleshooting, covering features like dual-channel measurement, probe attenuation, trigger modes, and various measurement functions. Ideal for electronics enthusiasts, students, and professionals needing a compact and multi-functional test tool.
	[ZEEWEII DSO3D12 Digital Oscilloscope User's Manual] Comprehensive user manual for the ZEEWEII DSO3D12 Digital Oscilloscope, covering operation, safety precautions, quick start instructions, probe calibration, trigger system, horizontal and vertical system details, signal generator functions, and multimeter parameters. This guide helps users understand and effectively utilize the device's features for accurate electronic measurements.