LiebeWH T3100

LiebeWH T3100 X100 100MHz High Voltage Oscilloscope Probe User Manual

Model: T3100 | Brand: LiebeWH

1. Introduction

The LiebeWH T3100 X100 High Voltage Oscilloscope Probe is designed to convert high voltage signals into lower, measurable voltages suitable for oscilloscope analysis. This probe features a 100:1 attenuation ratio and a 100MHz bandwidth, making it suitable for a wide range of electrical testing applications. Its robust design ensures stable performance, high accuracy, and minimal interference, providing reliable measurements for professionals and enthusiasts alike.

2. Safety Information

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

- **High Voltage Warning:** This probe is designed for high voltage measurements. Always exercise extreme caution when working with high voltages.
- **Grounding:** Ensure the oscilloscope and the device under test are properly grounded before making any connections.
- **Insulation:** Do not touch the probe tip or any exposed metal parts during operation. Ensure the probe's insulation is intact and free from damage.
- **Environmental Conditions:** Use the probe in dry conditions. Avoid using it in wet or damp environments.
- **Proper Connection:** Always connect the probe to the oscilloscope before connecting it to the circuit under test. Disconnect from the circuit under test before disconnecting from the oscilloscope.
- **Maximum Input Voltage:** Do not exceed the maximum input voltage rating of the probe. Refer to the specifications section for details.

3. Package Contents

Verify that all items listed below are present in your package:

- 1 x T3100 X100 High Voltage Oscilloscope Probe

- 1 x Ground Lead with Alligator Clip
- 1 x Adjustment Tool (Screwdriver)
- 1 x Probe Tip Hook
- 8 x Color Rings (for channel identification)
- 2 x Probe Tip Caps

Image 3.1: The T3100 oscilloscope probe with its included accessories, including the main probe body, ground lead, adjustment tool, probe tip hook, color rings, and tip caps.

4. Product Overview

4.1. Components

The T3100 probe consists of several key components designed for safe and accurate high voltage measurement:

- **Probe Tip:** The point of contact with the circuit under test. It is typically protected by a removable cap or hook.
- **Probe Body:** The main insulated housing of the probe, providing a safe grip.
- **Ground Lead:** A short lead with an alligator clip that connects the probe's ground reference to the circuit's ground.

- **Cable:** The coaxial cable connecting the probe body to the oscilloscope.
- **BNC Connector:** The connector at the end of the cable that plugs into the oscilloscope's input channel.
- **Compensation Adjustment Screw:** A small screw located on the probe body for fine-tuning the probe's frequency response.

Image 4.1: A close-up view of the T3100 probe tip, showing the removable hook, and the included color rings and adjustment tool.

5. Specifications

Parameter	Value
Model	T3100
Attenuation Ratio	1:100
Input Resistance	100 MΩ
Input Capacitance (X100)	14.5pF ~ 17.5pF
Compensation Range	15pF ~ 35pF

Parameter	Value
System Bandwidth	DC ~ 100MHz
Maximum Input Voltage	2000V (DC + Peak AC)
Operating Temperature	0°C to 50°C
Humidity	0% to 80% RH
Weight	84 g

6. Setup

6.1. Connecting the Probe to an Oscilloscope

Follow these steps to properly connect your T3100 probe to an oscilloscope:

1. **Power Off:** Ensure both the oscilloscope and the circuit under test are powered off.
2. **Connect BNC:** Plug the BNC connector of the T3100 probe firmly into an input channel of your oscilloscope.
3. **Attach Ground Lead:** Connect the alligator clip of the probe's ground lead to the ground terminal of the oscilloscope.
4. **Connect to Circuit:** Once the oscilloscope is powered on and ready, connect the probe's ground clip to the ground reference of the circuit under test. Then, carefully touch the probe tip to the test point on the circuit.

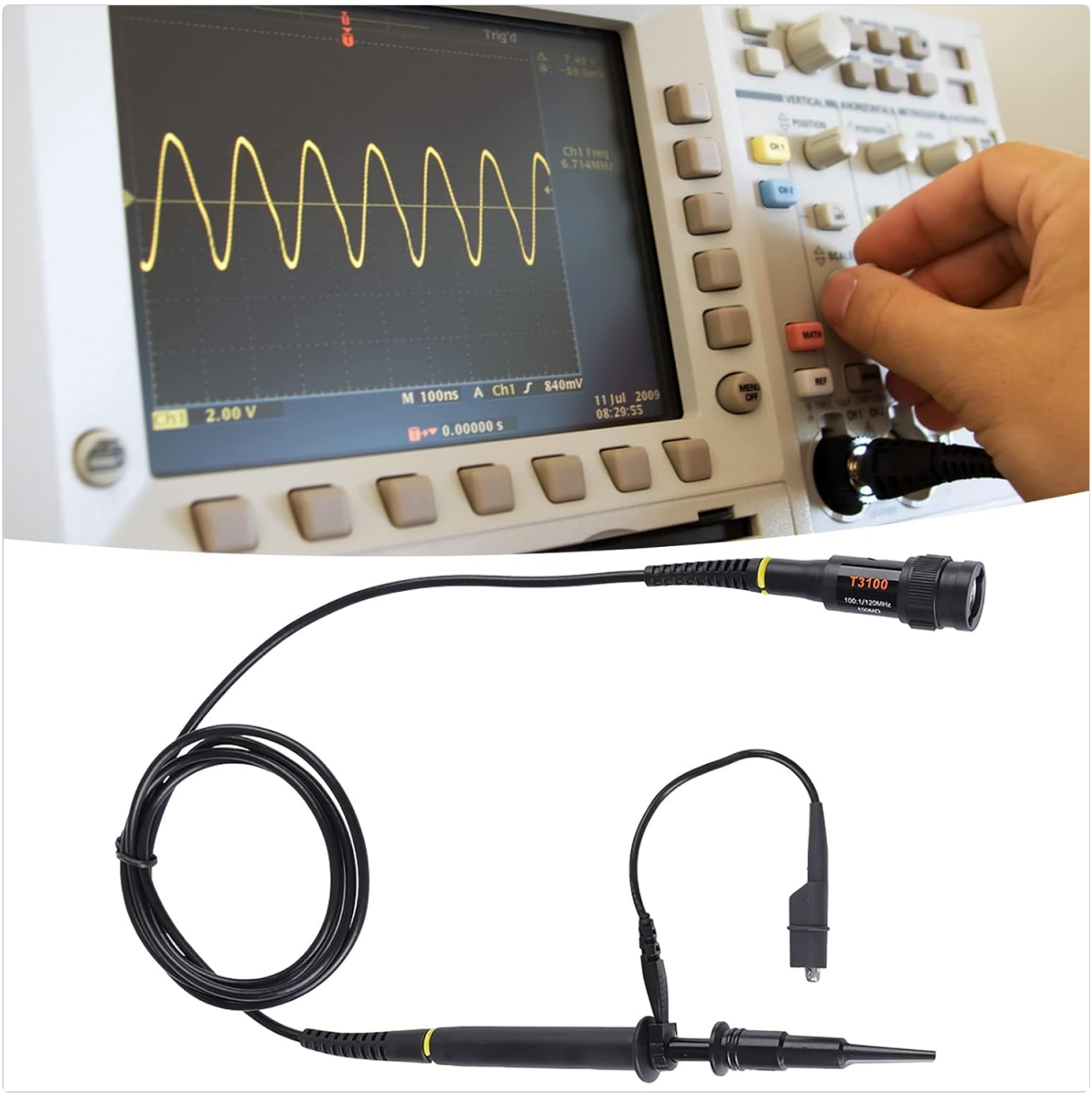

Image 6.1: The T3100 probe connected to an oscilloscope, demonstrating a typical setup for waveform analysis.

6.2. Compensation Adjustment

Proper probe compensation is crucial for accurate measurements, especially at higher frequencies. This adjusts the probe's capacitance to match the oscilloscope's input capacitance.

1. **Connect to Calibration Output:** Connect the probe to the oscilloscope's probe compensation output (usually a square wave signal, typically 1kHz, 5Vpp).
2. **Set Oscilloscope:** Set the oscilloscope channel to DC coupling, 100:1 attenuation (if available, otherwise manually calculate), and adjust the time base and vertical scale to view the square wave.
3. **Adjust Compensation:** Use the provided adjustment tool (small screwdriver) to turn the compensation screw on the probe body until the square wave displayed on the oscilloscope screen has flat top and bottom edges with sharp corners (neither rounded nor overshot).
4. **Verify:** A correctly compensated probe will display a clean square wave. An under-compensated probe will show rounded corners, while an over-compensated probe will show overshoot.

7. Operating Instructions

7.1. Making Measurements

Once the probe is connected and compensated, you can begin making measurements:

- **Select Channel:** Choose the appropriate input channel on your oscilloscope.
- **Set Attenuation:** Manually set the oscilloscope's vertical scale to account for the probe's 100:1 attenuation. For example, if the oscilloscope reads 1V/division, the actual voltage is 100V/division. Many modern oscilloscopes allow you to set the probe attenuation factor directly in the channel settings.
- **Connect to Test Point:** Carefully connect the probe tip to the desired test point in the circuit. Ensure the ground lead is securely connected to the circuit's ground.
- **Adjust Display:** Adjust the oscilloscope's vertical and horizontal scales to obtain a clear and stable waveform display.

7.2. Attenuation Setting

The T3100 probe has a fixed attenuation ratio of 100:1. This means that the voltage measured by the oscilloscope is 1/100th of the actual voltage at the probe tip. When reading measurements from the oscilloscope, multiply the displayed voltage by 100 to get the true voltage value. For example, if the oscilloscope displays 5V, the actual voltage is 5V * 100 = 500V.

8. Maintenance

Proper care and maintenance will extend the life and ensure the accuracy of your probe.

- **Cleaning:** Clean the probe body with a soft, dry cloth. If necessary, use a cloth lightly dampened with water or a mild detergent. Do not use abrasive cleaners or solvents.
- **Storage:** Store the probe in a clean, dry environment, away from direct sunlight and extreme temperatures. Use the provided protective caps for the probe tip and BNC connector when not in use.
- **Inspection:** Regularly inspect the probe cable, connectors, and insulation for any signs of damage, such as cuts, cracks, or frayed wires. Do not use a damaged probe.
- **Calibration:** Periodically check the probe compensation, especially if you notice discrepancies in measurements or if the probe has been subjected to significant temperature changes.

9. Troubleshooting

If you encounter issues with your T3100 probe, refer to the table below for common problems and solutions.

Problem	Possible Cause	Solution
No signal on oscilloscope	Probe not connected properly; Oscilloscope channel off; No signal from circuit.	Ensure BNC connector is secure; Check ground lead connection; Verify oscilloscope channel is enabled; Confirm circuit is active.
Distorted or inaccurate waveform	Improper probe compensation; Incorrect oscilloscope settings (e.g., attenuation); Damaged probe.	Perform probe compensation (Section 6.2); Adjust oscilloscope vertical scale for 100:1 attenuation; Inspect probe for damage.
Noisy or unstable waveform	Poor ground connection; Electromagnetic interference; Faulty probe.	Ensure ground lead is securely connected to circuit ground; Minimize external interference sources; Test with another known good probe if possible.
Probe tip not making good contact	Dirty or bent probe tip; Incorrect accessory used.	Clean probe tip; Ensure tip is straight; Use appropriate probe tip accessory (e.g., hook).

10. Warranty and Support

10.1. Warranty Information

This LiebeWH T3100 Oscilloscope Probe comes with a standard manufacturer's warranty against defects in materials and workmanship. The warranty period typically covers 10 days for replacement from the date of purchase. Please retain your proof of purchase for any warranty claims. The warranty does not cover damage caused by misuse, accident, unauthorized modification, or improper operation.

10.2. Customer Support

For technical assistance, troubleshooting, or warranty inquiries, please contact LiebeWH customer support through the retailer where the product was purchased or visit the official LiebeWH website for contact information. When contacting support, please have your product model (T3100) and purchase details ready.