

High Voltage Differential Probes

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High Voltage Differential Probes: Micsig DP10013 and Alternatives

High voltage differential probes are essential tools for measuring signals in systems where the signal reference point is not directly connected to the ground, such as in floating ground circuits. These probes are particularly important for safely analyzing high-voltage systems, such as the secondary side of Stanley Meyer's VIC (Voltage Intensifier Circuit), where improper grounding or connections can lead to dangerous conditions or inaccurate measurements. In this article, we will look at several economical high voltage differential probes, including the **Micsig DP10013**, and discuss their benefits, safety aspects, and the importance of using isolated probes for certain applications.

Importance of High Voltage Differential Probes

When working with circuits involving high voltages or floating grounds, such as the secondary side of a transformer or a resonant power supply like Meyer's VIC, a standard oscilloscope probe can create significant safety risks. If you connect a standard probe with a ground clip to a part of the circuit that is not at ground potential, you may inadvertently create a short circuit that can damage the equipment or cause injury.

High voltage differential probes, like the **Micsig DP10013**, are specifically designed for such scenarios. They provide isolated measurements by measuring the difference between two points without connecting either point directly to the oscilloscope's ground. This isolation prevents potential shorts and allows for accurate readings in circuits with floating grounds.

Key Benefits of Using High Voltage Differential Probes

1. **Isolation for Floating Ground Systems:** Differential probes are isolated from ground, which means they can safely measure signals in circuits where there is no common

ground. This is particularly important in power electronics applications, such as the VIC secondary side, where both measurement points may be floating with respect to ground. This prevents accidental shorts and damage to sensitive components.

2. **True Differential Measurement:** By measuring the difference between two points, high voltage differential probes provide a true differential reading of the voltage. This is particularly useful for capturing the behavior of high-voltage signals across components without introducing ground loops or noise.
3. **Higher Voltage Ranges:** Differential probes are capable of handling much higher voltage levels than standard passive probes. For example, the **Micsig DP10013** can measure up to **1300V peak**, making it suitable for power electronics, resonant circuits, and transformer secondary-side analysis.

Economical High Voltage Differential Probes

1. Micsig DP10013 High Voltage Differential Probe

The **Micsig DP10013** is an affordable differential probe designed for high voltage applications. It is capable of measuring up to **1300V peak** and offers multiple attenuation settings (50:1 and 500:1) for flexibility in various scenarios.

- **Bandwidth:** The DP10013 has a **100 MHz** bandwidth, which is sufficient for capturing fast transients and high-frequency switching events in power electronics.
- **Safety:** The probe is designed to safely handle high voltages, and its isolation ensures that there are no unintentional shorts when measuring floating circuits. The probe also has a robust input protection rating to prevent damage in case of unexpected voltage spikes.
- **Application:** This probe is suitable for use with power inverters, motor drives, transformer analysis, and other high-voltage systems.

2. Hantek T3100 Differential Probe

The **Hantek T3100** is another economical option for those looking for a high voltage differential probe. It offers a maximum voltage rating of **1300V peak** and a bandwidth of **100 MHz**, similar to the Micsig DP10013.

- **Attenuation Settings:** The Hantek T3100 provides selectable attenuation ratios of **50:1** and **500:1**, making it versatile for a wide range of voltage levels.
- **Compatibility:** It is compatible with most oscilloscopes that have a standard BNC input, making it easy to integrate with existing test setups.
- **Use Case:** Like the Micsig DP10013, the Hantek T3100 is ideal for power electronics, motor drives, and other high-voltage floating ground applications.

3. Pico Technology TA041 Differential Probe

The **Pico Technology TA041** is another reliable high voltage differential probe, with a maximum voltage rating of **1400V peak**. It provides a lower bandwidth of **25 MHz**, which may be sufficient for lower frequency applications and DC-DC converter analysis.

- **Attenuation and Safety:** The TA041 has **100:1** and **1000:1** attenuation options, providing flexibility for measuring different voltage ranges. Its input protection is designed to handle sudden spikes, ensuring both user safety and equipment protection.
- **Applications:** This probe is well-suited for high-voltage DC measurements, power supply analysis, and general power electronics troubleshooting.

Safety Considerations When Using High Voltage Differential Probes

- **Overvoltage Protection:** Differential probes are typically rated to handle a specific peak voltage. It's crucial not to exceed this rating, as doing so could damage the probe, the oscilloscope, or cause personal injury. Always check the voltage levels in your circuit and ensure they are within the probe's safe range.
- **Loading Effect:** Every probe has an input impedance that can load the circuit under test, potentially affecting its operation. High voltage differential probes often have a high input impedance to minimize this effect, but it's important to be aware that sensitive circuits, especially those involving resonance, can be influenced by the presence of the probe. To minimize loading, choose a probe with the highest possible input impedance.
- **Proper Grounding:** While differential probes are isolated, it is still important to connect the ground properly as per the instructions. Misconnections can lead to inaccurate measurements or unsafe conditions.

Conclusion

High voltage differential probes, such as the **Micsig DP10013**, **Hantek T3100**, and **Pico Technology TA041**, are essential tools for safely measuring signals in high-voltage or floating ground systems. These probes offer isolation, allowing for accurate and safe measurements without introducing shorts or ground loops. Their ability to measure high voltages in a true differential manner makes them invaluable for applications such as the VIC secondary side, power inverters, and other high-voltage electronics projects.

When selecting a differential probe, consider the maximum voltage rating, bandwidth, and attenuation options that fit your needs. Always follow safety guidelines to prevent overvoltage conditions and be mindful of the probe's impact on the circuit under test. By using the right high voltage differential probe, you can make accurate, safe measurements, ensuring the success of your high-voltage experiments.

DIY HV Isolated Probe

The following is a DIY probe you can make to isolate your scope from the high voltages of the VIC

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HV Oscilloscope Probes

https://www.amazon.com/Micsig-DP10013-Differential-Attenuation-Tektronix/dp/B074K4XPW3/ref=sr_1_3?crid=12RQYANGE3JLG&keywords=high+voltage+probe&qid=1659218038&srefix=high+voltage+probe%2Caps%2C145&sr=8-3

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