

Extreme Temperature Probing Solutions for Oscilloscopes

The Industry's Most Comprehensive Extreme-Temperature Chamber Testing Solutions for Oscilloscopes

- Passive and active probing solutions for extreme environmental testing
- Supports temperature ranges as wide as -55 to +150 °C

Introduction

Many engineers have a need to monitor their product in an environmental chamber with an oscilloscope probe to verify performance over a wide range of operating temperatures or to determine the cause of failures at high or low temperatures. Until now, testing in extreme temperature ranges required engineers to use probes outside their specified operating temperatures, which can damage probes. Most active or passive probes in the market have a specified operating temperature range anywhere from 0 to 50 °C. However, Keysight offers various extreme temperature probing solutions that can be operated over a much wider -40 to +85 °C range or even beyond. This allows you to operate the probe head and the supplied probing accessories inside a temperature chamber with the probe pod and oscilloscope located outside the temperature chamber.

Probing Solutions

For extended temperature testing with more extreme temperature range measurements, Keysight offers the N5450B InfiniiMax extreme-temperature extension cable with the InfiniiMax Series differential probing system, which gives engineers the ability to probe signals at even wider temperature ranges. When used with the Keysight MX0100A or MX0109A differential solder-in probe head, this solution provides engineers with the widest temperature range coverage of -55 to 150 °C, which is the maximum temperature range specified for automotive-electronics testing.



Solutions for Engineers in Many Industries

For customers working in semiconductor, consumer, wireless mobile devices, automotive electronics, and computer industries who need to validate and characterize their designs while operating within extreme temperature ranges.

The MX0100A and MX0109A have undergone rigorous environmental testing to ensure the probes can withstand the following specifications. Operating temperature range ratings:

- -55 °C dwell, 1,000 hours minimum
- +150 °C dwell, 1,000 hours minimum
- -55 to +150 °C cycles, 1,000 cycles minimum per JEDEC JESD22-A104 revision E (MX0100A)
- -55 to +150 °C cycles, 750 cycles minimum per JEDEC JESD22-A104 revision E (MX0109A)

These Keysight probe heads maintain their specified frequency response (and bandwidth) over the operating temperature range, without any need for compensation or correction. High temperatures may cause the probe components to darken but this does not affect measurement quality.



MX0106A 23 GHz Differential Solder-in Head

The MX0106A is a solder-in head allowing a soldered connection into the target for a reliable hands-free connection. This probe configuration provides 23 GHz bandwidth and low capacitive loading for measuring both single-ended and differential signals. It utilizes strong 7 mil (or optional 4 mil) diameter nickel wires, which allow connection to very small, fine pitch targets, and the lead wires are replaceable. The solder-in head allows for wide operating temperature of -55 to +150 °C. The MX0106A supports InfiniiMode, offering a way to measure differential, single-ended, and common mode signals without reconnecting the probe.



N2820A/21A High-sensitivity current probe

When accurate and repeatable current measurements inside the chamber are critical over wide temperature ranges, the N2820A/21A high-sensitivity current probe is the best choice, especially for precision current measurement applications. When the user-defined head is used with the N2820A/21A current probe, it provides the industry's highest sensitivity current measurement solution among oscilloscope current probes, going all the way down to 50 μ A with a maximum current range of 5 A operating over the temperature range of -55 to 150 °C.



N2797A 1.5 GHz Single-ended active probe

The N2797A 1.5 GHz single-ended active probe is the industry's first low-cost high-impedance active probe for environmental chamber testing of ICs and electronic devices at temperatures ranging from -40 to +85 °C. The probe provides 1.5 GHz of bandwidth and high resistance (1 M Ω) and low capacitance (1 pF) input for low probe loading.



N7007A 400 MHz passive probe

The N7007A 400 MHz passive probe is a low-cost, high-impedance passive probe with rugged probe tips for environmental chamber testing from -40 to +85 °C. Its large input impedance (10 M Ω at DC) and wide input voltage range (1,000 Vdc + peak AC CATII) makes the probe ideal for a broad range of general purpose extreme temperature applications.



N7013A 70 cm long extreme temperature extension kit

The N7013A is a 70 cm long extreme temperature extension kit compatible with four of Keysight's medium- and high-voltage differential active probes including the N2790A, N2791A, N2792A and N2818A. These probes are typically used in power supply testing applications, as well as testing automotive differential buses including CAN, CAN FD, and FlexRay. With the N7013A extension kit, the extension cables and connection adapters can be extended into the environmental chamber under extreme-temperature conditions ranging from -40 to +85 °C.

This extreme temperature probing solution provides an ideal solution for engineers working with the semiconductor, consumer, wireless mobile devices, automotive electronics, and computer industries who need to validate and characterize their designs while operating within extreme temperature ranges. Keysight now offers the broadest selection of extreme-temperature oscilloscope probing solutions in the market.

There are different bandwidths, temperature ranges and test cycle numbers depending on which probe head/tip you select to use.

Summary of Extreme Temperature Probing Solutions

Probe head and accessories	Compatible probe amplifiers	Measurement type	Max bandwidth	Temperature range	Test cycle numbers
MX0109A solder-in probe head	InfiniiMax III/III+	Single-ended or differential, supports InfiniiMode	26 GHz	-55 to +150 °C	1000+
MX0106A solder-in probe head	InfiniiMax Gen I/II/Ultra/RC	Single-ended or differential, supports InfiniiMode	23 GHz	-55 to +150 °C	1000+
MX0100A micro solder-in probe head	InfiniiMax Gen I/II/Ultra/RC	Single-ended or differential, supports InfiniiMode	25 GHz	-55 to +150 °C	1000+
N5381B solder-in probe head	InfiniiMax Gen I/II/Ultra/RC	Single-ended or differential	12 GHz	-40 to +85 °C	1000+
E2677B solder-in probe head	InfiniiMax Gen I/II/Ultra/RC	Single-ended or differential	12 GHz	-25 to +80 °C	1000+
E2678B socketed probe head	InfiniiMax Gen I/II/Ultra/RC	Single-ended or differential	12 GHz	-25 to +80 °C	1000+
N5425B ZIF head + N5426A tip	InfiniiMax Gen I/II/Ultra/RC	Single-ended or differential	18 GHz	-40 to +85 °C	500+

Probe head and accessories	Compatible probe amplifiers	Measurement type	Max bandwidth	Temperature range	Test cycle numbers
N5450B extension cable	InfiniiMax Gen I/II/III/III+/RC/Ultra	Single-ended or differential	N/A	-55 to +150 °C	1000+
N2797A single-ended active probe	N/A, for additional accessories order N2798A	Single-ended	1.5 GHz	-40 to +85 °C	
N7007A passive probe	N/A, comes with retractable hook tips, alligator ground leads and spring ground tip. To reorder the accessories, order N7006A spring ground tip, N7008A retractable hook tip or N7009A alligator ground lead.	Single-ended	400 MHz	-40 to +85 °C	
N7013A differential extension kit	N2818A, N2790/2A, N2791A differential active probes, also includes one each pair of differential extension cables (70 cm long), hook tip adapters and banana-to-socketed tip adapters for connecting to 0.025" sq pins. Order N7014A for an extra banana-to-socketed tip adapter pair.	differential	70 MHz with N2818A, N2790/2A, 25 MHz with N2791A	-40 to +85 °C	
N2820A current probe	N/A	Single-ended current	3 MHz (zoom-out) / 500 kHz (zoom-in)	-40 to +85 °C	

For more information on Keysight's probing solutions, visit the [Probe Resource Center](#).

Conclusion

Many engineers have a need to monitor their product in an environmental chamber with an oscilloscope probe to verify performance over a wide range of operating temperatures or to determine the cause of failures at high or low temperatures. Until now, testing in extreme temperature ranges required engineers to use probes outside their specified operating temperatures, which can damage probes. Most active or passive probes in the market have a specified operating temperature range anywhere from 0 to 50 °C. However, Keysight offers various extreme temperature probing solutions that can be operated over a much wider -40 to +85 °C range or even beyond. This allows you to operate the probe head and the supplied probing accessories inside a temperature chamber with the probe pod and oscilloscope located outside the temperature chamber.

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications, or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

