UFO miniProbe User Guide

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Overview

The miniProbe monitors your system's critical power related parameters such as voltage, current and temperature. It is designed to work with a wide range of power supply modules and power busses.

To get started, you will:

- Choose the miniProbe version to match your system's power connector type.
- Mount and Connect the miniProbe between the power supply module and the power bus, or between a single module and the power bus.
- Set the miniProbe temperature jumpers to enable or disable front panel temperature inputs.
- Use the provided thermal adhesive labels to adhere a long temperature lead to the system's power supply voltage regulator heat sink or other surface.
- Connect 1 short temperature lead to the internal T2 input to monitor the case's internal ambient temperature.
- Connect 1 short temperature lead to the external T3 input to monitor the case's external ambient temperature.

Hardware Versions

The miniProbe is available in two versions; a ribbon header connector version, and a screw header connector version.

The ribbon header version can monitor any power bus which implements Eurorack ribbon type connectors. The ribbon header version can also monitor a single module when it is connected inline between the target module a power bus.

The screw headers version can monitor power buses of various connection types. Power cables can either be connected directly into the miniProbe's screw headers, or through conversion cables such as the MTA-156 connector.

Module Installation

Monitor a Single Module

The miniProbe can be installed inline between a single module and a power bus to monitor the voltage, power, current consumption, and temperature of the isolated module. This installation configuration is useful when designing new or custom modules, as well as when discovering or validating 3rd party module power specifications, performance or tolerances.

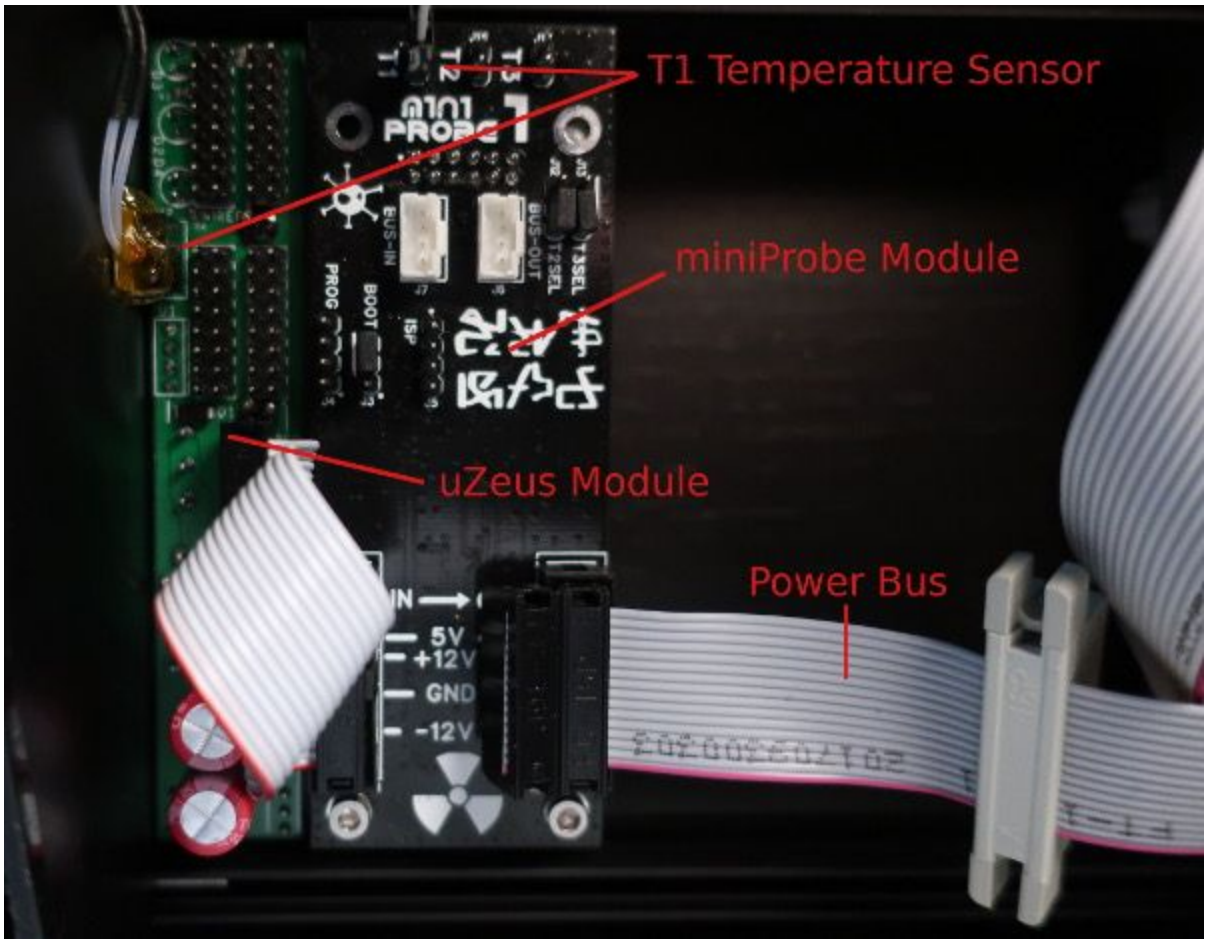
To monitor a single module using the ribbon header miniProbe version, install the miniProbe between the power bus and target module:

- Connect the miniProbe ribbon header labelled ‘IN’ to the power bus.
- Connect the miniProbe ribbon header labelled ‘OUT’ to the target module.

To monitor a single module using the screw header miniProbe version, disconnect all modules on the power bus, leaving only the target module connected.

Monitor a Power Bus

The miniProbe can be installed to monitor a full power bus, capturing the combined voltage and current of all modules connected to the bus. In this configuration, the miniProbe is connected inline between the power supply module and power bus. The miniProbe cannot be simultaneously connected to more than one power bus. If a power supply has more than one power bus to be monitored simultaneously, a miniProbe is required for each power bus.



Installing Temperature Probes

The miniProbe's three temperature sensor inputs are labelled T1, T2 and T3. The three temperature sensor leads provided connect to these inputs. Temperature probes on the ends of the leads can be adhered to voltage regulator heat sinks such as power supplies, or to rack case surfaces and module panels.

The three temperature leads provided include:

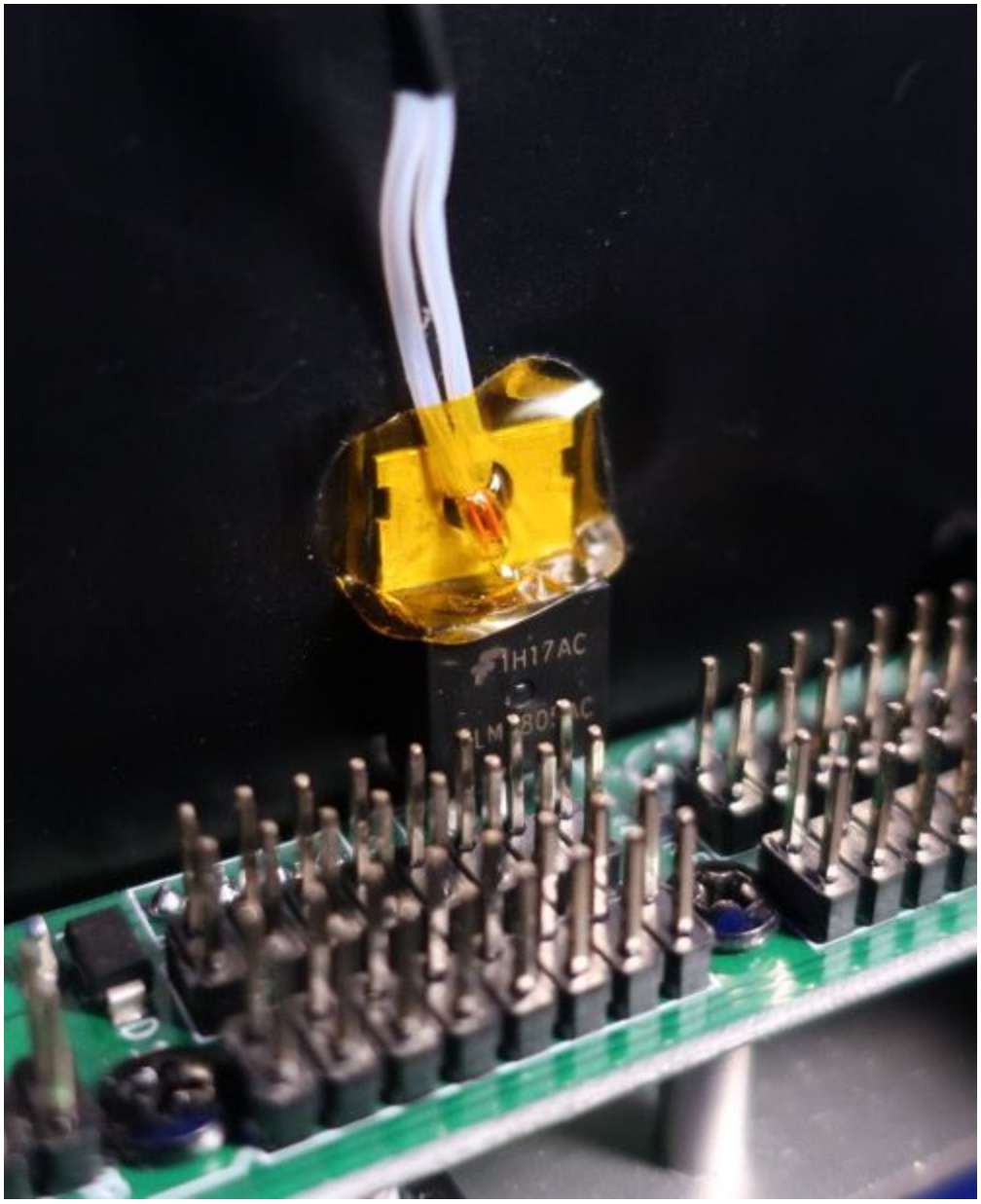
- Two 1 inch leads
- One 6 inch lead

Typically, one short lead is used to monitor the case's internal ambient temperature (T1), one long lead is used to monitor the power supply's heat sink or voltage regulator temperature (T2), and one short length lead is used to monitor the case's external ambient temperature (T3).

Thermal Adhesive Labels are included with the miniProbe. The labels are lined with pressure activated silicone, are heat tolerant up to 180 degrees Celsius, and are used to adhere the

temperature lead ends to a voltage regulator heat sink or other metal surface. A hot glue gun can also be used to adhere the end of temperature lead to metal surfaces. Note the temperature lead probes are made of glass.

Adhesive Label holding temperature sensor to power supply voltage regulator and side case:



The miniProbe includes a total of 5 temperature lead inputs; 3 on the back of the miniProbe and 2 on the front panel. Temperature leads can be connected and disconnected from the front inputs while the miniProbe is powered on.

The temperature lead input labeled T1 is located on the back of the module. The T1 input is typically used to connect a 1 inch temperature lead to monitor the case's internal ambient temperature, but can be used to monitor any temperature internal to the case using a longer lead.

Two temperature lead inputs labeled T2 are located on the miniProbe; 1 on the back of the module and 1 on the bottom left of the front panel. This allows the T2 temperature lead to be connected either inside the case, or externally on the front panel. The lead can be connected and disconnected from the front input while the miniProbe is powered on. A jumper on the back of the miniProbe labeled T2SEL is used to select which of the 2 inputs for T2 is enabled. To enable the internal T2 input, set the T2SEL jumper to the pins marked by a white line. Set the jumper on the other 2 pin (the pins NOT marked by a white line) to enable the external T2 input located on the bottom left side of the front miniProbe panel.

The T2 temperature sensor is typically connected on the back of the miniProbe and used to monitor the case's power supply voltage regulator heat sink.

Two temperature leads labeled T3 are located on the miniProbe; 1 on the back of the module and 1 on the bottom right side of the front panel. This allows the T3 temperature lead to be connected either inside the case, or externally on the front panel. The lead can be connected and disconnected from the front input while the miniProbe is powered on. A jumper on the back of the miniProbe labeled T3SEL is used to select which of the 2 inputs for T3 is enabled. To enable the internal T3 input, set the T3SEL jumper to the pins marked by a white line. Set the jumper on the other 2 pin (the pins NOT marked by a white line) to enable the external T3 input located on the bottom right side of the front miniProbe panel.

Menu Mode

In Menu Mode, the miniProbe displays a menu to access miniProbe settings and features. To enable Menu Mode, press and hold the knob.

Turn the knob to navigate menu items. Press the knob to select a menu item.

With a menu item selected, turn the knob to choose a value. Press the knob to store the selected value.

Select the 'Back' menu item to navigate up the menu tree.

Select the 'Exit' menu item to return to 'Live Stats' mode.

Live Stats Mode

On power-up, the miniProbe automatically cycles through pages displaying both Live and Statistical sensor data for voltages, amps, watts, and temperatures. Sensor titles and corresponding values are shown for several seconds before displaying the next sensor output page. Paging occurs at a configurable interval, with the initial default interval set to 5 seconds.

To page through live sensor data, rotate the knob.

To pause auto-paging, tap the knob.

To resume auto-paging, rotate or tap the knob.

For Statistical Pages, the top display shows Maximum values, the middle display shows Average values, and the bottom display shows Minimum values.

For Live Pages, the top display shows +12V live values, the middle display shows -12V live values, and the bottom display shows +5V live values. When displaying live temperature values, the top display shows T1, the middle display shows T2, and the bottom display shows T3.

To configure displayed pages:

Press and hold the knob and select ‘Display’ from the Menu.

Menu Items prefixed with ‘Live’ represent pages showing real-time Volt, Amp and Watt sensor values for the +12, -12 and +5 power sources, as well as values for 3 separate Temperature sensors.

Menu items prefixed with ‘Stat’ represent pages showing Maximums, Averages and Minimums. The Volt, Amp and Watt sensors values for the +12, -12 and +5 power sources are displayed, as well as values for 3 separate Temperature sensors labeled T1, T2 and T3.

Alarms

Each miniProbe sensor can trigger an alarm when its value reaches a minimum or maximum threshold.

Minimum Voltage, Maximum Voltage, and Maximum Amperage Alarms can be set for the +12V, -12V and +5V power buses.

Maximum temperature alarms can be set for all 3 temperature sensors.

When a threshold is reached for Voltage and Temperature alarms, a notification is shown on the displays. To clear the notification from the displays, select 'Clear->ClearAlarms' from the Main Menu.

When a threshold is reached for Amperage alarms, the power bus is switched off and a notification is shown on the displays. Amperage alarms act as a soft circuit breaker, cutting the power to the bus. The power bus will remain disabled until the power supply is turned off and back on.

To configure alarms:

Press and hold the knob and select 'Alarms' from the Main Menu.

Additional Settings

Page Transitions

When in Live Stats mode, the miniProbe outputs its sensor data by automatically transitioning from page to page. A Title page is first shown for a set duration prior to the corresponding data being displayed on the next page. The Titles identify which sensors are represented by the data on the following page.

To customize the fade in, fade out and pause durations for title and data page transitions:

Press and hold the knob and select 'More->Settings->ScreenTiming' from the Main Menu.

All values are given in milliseconds. In addition, here are two default settings that can be chosen from the menu. Default A sets the display to a fast transition between screens. Default B sets a slower transition.

Temperature Units

To set the temperature output units to Fahrenheit or Celsius, select 'More->Settings->TempUnits' from the Menu.

Passive Monitoring

The power consumed by the miniProbe is factored into the sensor values output to the displays.

To exclude the miniProbe's power consumption from the output values, select 'More->Settings->IncludeUFO' from the Main Menu and set the value to 'NO'.

Factory Reset

To perform a complete factory reset, select ‘More->Settings->FactoryReset’ from the Main Menu.

All settings, alarms, and data logs will be cleared and set back to factory defaults.

Voltage Monitoring

The miniProbe senses voltage on 3 power rails; +12V, -12V and +5V.

The voltage consumed by the miniProbe is factored into the output values. To exclude the miniProbe power consumption from output values, select ‘More->Settings->IncludeUFO’ and set the value to ‘NO’.

Live Page

The Live Voltage page shows the voltage output for the +12V rail on the top display, the +5V rail on the middle display, and the -12V rail on the bottom display. The voltage for each of the 3 power rails is sampled every 400us or faster.

Stats Page

The Stats Voltage page shows the maximum value on the top display, the average on the middle display, and the minimum value on the bottom display. Voltage statistics are cumulatively calculated from the initial power-up, or until manually cleared.

To Clear the Average, Minimum and Maximum values select ‘Clear>Clear Avg’, ‘Clear>Clear Min’, ‘Clear>Clear Max’, or ‘Clear>Clear All’ from the Menu.

Alarms

Alarms can be set to trigger when minimum or maximum voltage thresholds are reached. Alarms are displayed until cleared by selecting ‘Alarms->Clear’ from the Menu.

Reverse Voltage Protection

The miniProbe is designed to withstand reverse voltage on each power rail if a power supply cable is connected incorrectly by accident.

Amperage Monitoring

The miniProbe senses current on 3 power rails; +12V, -12V and +5V.

The current consumed by the miniProbe is factored into the output values. To exclude the miniProbe power consumption from output values, select 'More->Settings->IncludeUFO' and set the value to 'NO'.

Live Values

The Live Current Draw page shows amperage drawn for the +12V rail on the top display, the +5V rail on the middle display, and the -12V rail on the bottom display. The current draw for each of the 3 power rails is sampled every 400us or faster.

Stats Page

The Stats Current Draw page shows the maximum amperage value on the top display, the average amperage value on the middle display, and the minimum amperage value on the bottom display. Current Draw statistics are cumulatively calculated from the initial power-up, or until manually cleared.

To Clear the Average, Minimum and Maximum values select 'Clear>Clear Avg', 'Clear>Clear Min', 'Clear>Clear Max', or 'Clear>Clear All' from the Menu.

Alarms

Alarms can be set to trigger when maximum amperage thresholds are reached. Alarms are displayed until cleared by selecting 'Alarms->Clear' from the Menu.

Power Monitoring

The miniProbe calculates and displays the wattage consumed on 3 power rails; +12V, -12V and +5V.

The wattage consumed by the miniProbe is factored into the output values. To exclude the miniProbe power consumption from output values, select 'More->Settings->IncludeUFO' and set the value to 'NO'.

Live Values

The Live Watts page shows the wattage consumed for the +12V rail on the top display, the +5V rail on the middle display, and the -12V rail on the bottom display. The wattage for each of the 3 power rails is calculated from the voltage and current sampled every 400us or faster.

Stats Page

The Stats Watts page shows the maximum watts value on the top display, the average watts value on the middle display, and the minimum watts value on the bottom display. Wattage statistics are cumulatively calculated from the initial power-up, or until manually cleared.

To Clear the Average, Minimum and Maximum values select 'Clear>Clear Avg', 'Clear>Clear Min', 'Clear>Clear Max', or 'Clear>Clear All' from the Menu.

Temperature Monitoring

The miniProbe senses temperatures for up to 3 probes simultaneously. Typically, the case's internal ambient temperature, external ambient temperature and power supply voltage regulator temperature are monitored.

Live Values

The Live Temp page shows the values for the 3 temperature sensor leads connected to inputs labeled T1, T2 and T3. The top display shows output values for T1, the middle display values for T2, and the bottom display values for T3.

Stats Page

The Stats Temp page shows the maximum temperature value on the top display, the average temperature value on the middle display, and the minimum temperature value on the bottom display. Temperature statistics are cumulatively calculated from the initial power-up, or until manually cleared.

To Clear the Average, Minimum and Maximum values select 'Clear>Clear Avg', 'Clear>Clear Min', 'Clear>Clear Max', or 'Clear>Clear All' from the Menu.

Alarms

Alarms can be set to trigger when maximum temperature thresholds are reached. Alarms are displayed until cleared by selecting 'Alarms->Clear' from the Menu.

Internal Ambient Temperature

To monitor a case's internal ambient temperature, connect a short temperature lead to the T1 temperature sensor input on the back of the miniProbe as described in 'Installing Temperature Probes'. The T1 output value will appear on the top display.

External Ambient Temperature

To monitor a case's external ambient temperature, connect a short temperature lead to the T3 temperature sensor input on the front of the miniProbe as described in 'Installing Temperature Probes'. The T3 output value will appear on the bottom display.

Power Supply Temperature

To monitor a power supply's voltage regulator temperature, connect a long temperature lead to the T2 temperature sensor input on the back of the miniProbe as described in 'Installing Temperature Probes'. The T2 output value will appear on the middle display.

Experimental Features

In-Rush Test

While performing the In-Rush Test, the miniProbe attempts to monitor the peak currents drawn during system power-up, any over-voltages that might occur, as well as a calculated estimate of time spent in power-up state. The test is achieved by powering down the system briefly while keeping the miniProbe active, and then powering the system back up under software control in order to monitor the three power rails.

An abnormally long startup can indicate when a power supply has potentially reached its maximum operating capacity, and unable to reliably power all modules installed on the bus. This diagnosis may not be definitive, as one or more modules may by-design, induce large capacitive loads on the power supply during the power-up stage. Although a power supply may be able to handle large start-up loads, if large variations of minimum and maximum voltages are also observed once the system is up and running, the power supply has most likely reached its

maximum capacity. The miniProbe In-Rush test can help determine when a larger power supply is required, or when modules should be removed from the power bus.

High voltage overshoots during start-up can indicate a power supply providing poor voltage regulation. In extreme cases, repeated voltage overshoots could potentially cause damage to modules in the system. The miniProbe In-Rush test can help extend the life of modules by ensuring consistent and reliable power.

The In-Rush test has three settings that can be fine-tuned to closely match a system's power configuration: OFF TIME, ON TIME and BLANK TIME.

OFF TIME is the duration in seconds that the system will remain powered off before the In-Rush test begins. This duration allows any voltages held in capacitors on various modules to drain out, and in turn allowing the miniProbe to test the system from a pristine powered-off state.

ON TIME is the length of time in seconds that the miniProbe will monitor the supply rails after turning the power back on.

BLANK TIME is the length of time in microseconds to wait before starting to collect data after the system is powered on. There are normally 2 power spikes in a system, with the first being a very short high burst in the first microsecond and then a slower burst as the capacitors on the modules power up. Setting the BLANK TIME to 0 allows the system to monitor the first spike. Setting the BLANK TIME higher allows the system to monitor the second spike.

After the test is complete, the maximum voltage, current and wattage for each of the 3 rails is displayed as well as the rise time for the rail to reach 95% of its normal voltage. Note that this is the time to first reach that voltage and does not currently include how long it took the rail to stabilize in the event of an overshoot.

Module Specifications

Maximum Voltage : +16V on +12V and +5V rails, -16V on -12V rail

Maximum Current : 3 amperes continuous per voltage rail, 5 amperes peak

Dimensions : 8HP by 3U (40mm by 128.3mm), 30mm deep

Power consumption : 80mA peak on +12V (63mA nominal), 3mA on -12V, 0mA on 5V

Warranty

We pledge to all UFO Modular customers that our devices, when used as described in our published User Guides, are guaranteed to function free of material or manufacturing defects, for a period of 1 Year from the original retail purchase date.

The UFO Modular warranty does not cover damage caused by incorrect use. It is the user's responsibility to ensure power cables are connected correctly, power sources are of the correct voltage, and devices are not exposed to extreme ambient temperatures and/or humidity.

The warranty covers replacement or repair, as decided by UFO Modular Inc. UFO Modular implies and accepts no responsibility for harm to person or apparatus caused through operation of UFO Modular devices.

Return Policy

Please contact UFO Modular (support@ufomodular.com) to obtain a return authorization number before shipping.

UFO Modular is responsible for the shipping costs for replacement products sent back to the customers.

The customer is responsible for the shipping costs for sending product back to UFO Modular.