PMA SERIES USER GUIDE

Average Power Sensor
100 kHz to 20/40 GHz



V1.0
24/11/2026

HAROGIC

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1. Version Management

Updated Description Sheet

Version	Content	Date
V1.0	1. Initial version	24/11/2026



2. Quick Start Guide

This chapter provides a quick start guide for the PMA series, including operating environment requirements, instrument operation, software operation, and external interface descriptions.

2.1 Operating Environment Requirements

The supporting software for PMA series devices must be installed on the host computer. The recommended operating environment for the host computer is shown in the table below.

The table only lists the basic recommended configurations. For systems with configurations lower than the recommended requirements, please refer to the actual test results.

Table 1 Operating Environment Requirements

Operating System	Windows 11/10/7 (requires VS2019 C++ redistributable)
Architecture	Windows: x64 Linux: x86, AArch64
Processor	Intel i3 or above
Memory	4 GB or higher
Data Port	USB 2.0 or USB 3.0
Display Resolution	At least 830 × 530 pixels
Others	Some antivirus software may interfere with normal system operation

2.2 Default Software Storage Path Description

In the software directory, the "data" and "images" folders are used to store different types of files:

- **data folder**: Stores configuration files
- **images folder**: Stores chart images

Except for quick screenshots, the storage paths of other record files and images can be customized by the user.

2.3 Using the PMA Series Instruments

2.3.1 Driver Installation（Windows）

The following example describes installing the USB port driver on a Windows 11 64-bit system.

1. Check the computer system information, confirm the system version and number of bits;
2. Contact technical support and provide the operating system version and system architecture to obtain the appropriate driver installation files;
3. Double-click "CP210x_VCP_Win7_8.exe". After the driver installation interface appears, click "Next" through the prompts and follow the installation wizard to complete the driver installation by selecting an appropriate installation path;
4. Connect the cables according to the USB cable connection section, and plug the USB end of the cable into the host computer's USB port;
5. Open "Device Manager" on your computer and locate "CP2102 USB to UART Bridge Controller" under "Other devices". Right-click it and select "Update driver". Browse to and select the folder containing the driver files, then click "Next" to complete the driver installation；
6. Open "Device Manager" on the computer and check whether the power sensor driver appears under "Ports (COM & LPT)" as "Silicon Labs CP210x USB to UART Bridge (COMx)".

2.3.2 Driver Installation（Linux）

The following will be an example of installing the driver in Ubuntu 22.04.

1. Contact technical support to obtain the Linux driver folder and copy it to your local system;
2. Open the "/Linux/Driver" folder, right-click in the blank area, and select "Open in Terminal" to launch the terminal;
3. Execute *sudo sh install_pma.sh* in the terminal to configure the driver. After the configuration is completed, execute *sudo reboot* to restart the system.

2.3.3 Connecting the Device（USB）

USB cable connection:

1. Hold the cable connector housing and align the red dot on the connector with the "USB" marking on the device interface;

2. After alignment, insert the connector smoothly along the axis until it is fully seated and locked in place.

USB cable disconnection:

Hold the cable housing and gently pull it out along the axis. (Do not disconnect by pulling the cable itself, as this may damage the cable.)



2.3.4 Connecting the Device（LAN/PoE）

The PMA series average power sensor supports network connection via LAN/PoE. The LAN/PoE interface is used for Ethernet communication and also provides power via PoE. When using this interface, connect the power sensor to a PoE switch that supports the **IEEE 802.3af/at** standard.

Default network parameters:

- IP address: 192.168.1.101
- Subnet mask: 255.255.255.0
- Gateway: 192.168.0.1
- Port: 4001

1. Connect the LAN/PoE port of the power sensor to a PoE network, and connect the host computer to the same network;

2. Configure the IPv4 address of the host computer to ensure it is in the same subnet as the power sensor. For example, when using the device default IP address, set the host computer IP address to "192.168.1.20" and the subnet mask to "255.255.255.0";

3. Open the Command Prompt (Win + R -> enter "cmd") and execute the command "ping 192.168.1.101" to verify the network connection status;

4. Users can refer to the ETH Configuration section and connect the instrument via USB to modify and apply network settings, such as the device's IP address. After applying the changes, reconnect to the instrument using the new network settings.

2.4 Running the Software

2.4.1 Windows System

The instrument is assumed to be properly connected and the driver has been installed or the network has been configured.

Software Download:

1. Copy the software folder in the "Windows" directory of the provided USB drive to the computer desktop or another directory;

2. Double-click the executable file in the software directory to launch the power sensor software;

3. Select the appropriate connection method according to the hardware connection type:

- USB connection: Click "Device" -> "USB Connect" in the menu bar. In the pop-up connection window, select the corresponding serial device and click Connect;

- LAN/PoE connection: Click "Device" -> "ETH Connect" in the menu bar. In the pop-up connection window, enter the device IP address and port number, and click Connect;

4. After the connection is successful, the device status in the software interface changes from "Disconnected" to "MEASURING". The power sensor can then be used normally.



Figure 1 Normal software operating interface

2.4.2 Linux System

1. Copy the compressed package corresponding to the required architecture from Technical Support to the Linux system and extract it;

2. Navigate to the software installation package directory, open a terminal, and execute the following two commands to launch the power sensor software:

   sudo sh install-desktop.sh

   ./PMStudio

3. After the software starts, select the appropriate connection method according to the hardware connection type. For details, refer to the procedure for running the software on the Windows system above;

4. After a successful connection, the device status in the software interface changes from "Disconnected" to "MEASURING". The power sensor can then be used normally.

2.5 External Interface Description



Figure 2 PMA-400 Interface Description

Table 2 PMA Series Interface Description

No.	Interface Name	Description
1	**RF Signal Input**	PMA-200: N (M) PMA-400: 2.92 mm NMD (M) output 50Ω impedance
2	**LAN/PoE**	Used for Ethernet communication and supports powering the device through PoE.
3	**USB**	Connect to the host computer via USB to enable device control and power data readout.

3. Software Interface

3.1 Interface Layout

The software interface consists of the following sections:

- Menu Bar
- Measurement Result Area
- Parameter Setting Panel
- Status Information Area
- Measurement Trend Area



Figure 3 Software Interface Layout

4. General Operations

4.1 Save and Open Configuration Files

1. Save Current Configuration

1) Click "File" -> "Save State" in the menu bar;

2) In the "Save State" dialog, set the save path and file name, then click "Save" to save configuration files.

2. Load Preset Configuration

1) Click "File" -> "Recall State" in the menu bar;

2) In the "Recall State" dialog, select the configuration file and click "Open" to apply the preset configuration.

4.2 Set Power On State

The instrument supports user-defined startup states. Detailed description of the available power on state is provided in the table 3.

Table 3 Host Software Power On State

No.	Power On State Name	
1	**Default**	Instrument default configuration
2	**User Preset**	Use a user-saved configuration file as the initial power on configuration
3	**Last State**	Use the parameter configuration from the previous software session as the initial startup configuration

To set the startup state, follow these steps:

1. Click "File" -> "Power On State" in the menu bar;

2. For "Default" or "Last State", just click the option. The software will use the selected option as the initial state on the next startup;

3. Select "User Preset" and choose a user-saved configuration file in the "Select User Preset" dialog. The software will open with this specified configuration on the next startup.

4.3 ETH Configuration

The instrument supports remote connection through the LAN/PoE interface. When the instrument is connected to the host computer via the USB interface, users can view and modify the instrument's network configuration parameters.

Click "Device" -> "ETH Config" in the menu bar to open the ETH Configuration window. The window displays the current network parameters of the instrument, including the IP address, port number, subnet mask, and gateway. Users can modify the corresponding parameters according to the network environment and click the "Apply" button to apply the settings. If the message "ETH Configuration has been applied." is displayed in the window, it indicates that the network parameter modification has been completed successfully.

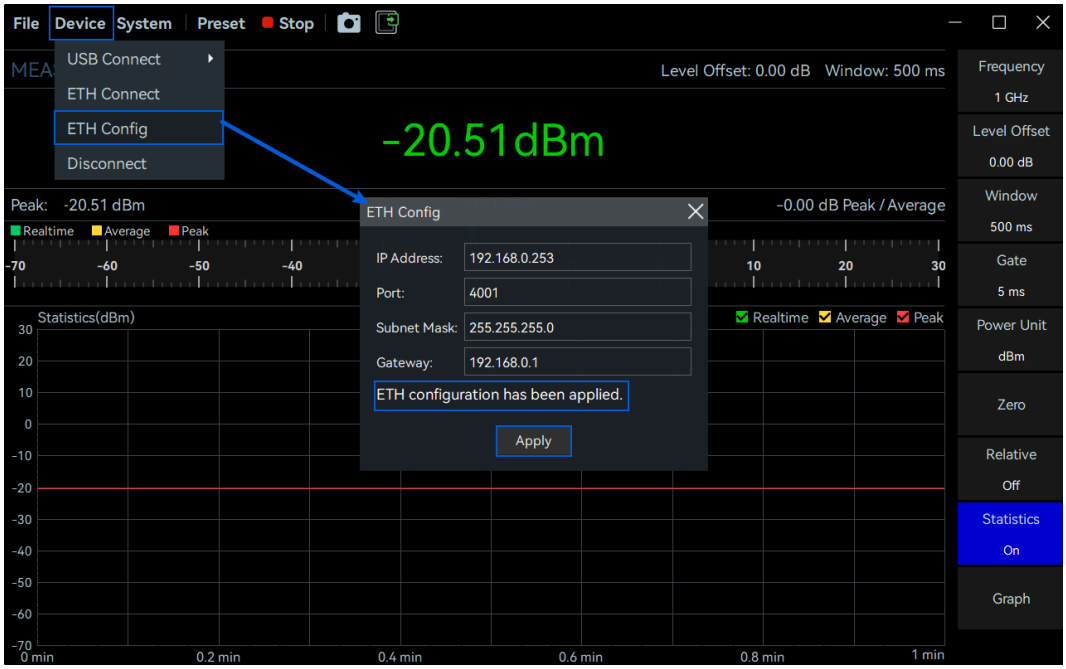


Figure 4 View and Modify ETH Configuration Parameters

4.4 Theme Setting

Click "System" -> "Theme" in the menu bar to switch between the "Dark" and "Light" themes.

4.5 Simulation

Click "System" -> "Simulation" to enable Simulation Mode. This feature is designed to simulate the power measurement process without connecting an actual power sensor device. Once enabled, the software updates the main power readings, power scale bars, statistical data, and trend charts based

on built-in or preset simulation data, allowing users to familiarize themselves with the software interface and basic operating procedures.

4.6 Viewing Instrument Information

Click "System" -> "About" in the menu bar. A dialog box will display information such as the model, serial number, and firmware version of the current instrument, as well as the corresponding software GUI and API versions.

4.7 Update

1. Click "System" -> "Update" in the menu bar. When the network connection is available, the system will start downloading the update package, and the "Update" button will temporarily become disabled. After the installation package is successfully downloaded and parsed, the window will display detailed update information, and the "Update" button will become active.
2. Carefully compare the information of the current version and the target version, and review the list of new features and fixes. After confirming that everything is correct, click the "Update" button in the lower-right corner.
3. After clicking the button, the software will automatically exit and enter the upgrade process. Please keep the update window open until the progress bar is completed and the software automatically restarts to enter the main interface.
4. Close the update information window, click "System" -> "About" in the menu bar, and check the current software and firmware version of the instrument.

4.8 Preset

Click the "Preset" button in the menu bar to restore the current software configuration to the instrument's default initial state.

4.9 Start and Stop Measurement

After connecting the instrument, measurement is automatically started by default. Users can control the measurement status through the "Start/Stop" button in the menu bar:

- **Stop:** Pauses power measurement. The measurement data and trend graph on the interface stop updating.
- **Start:** Resumes power measurement and continuously updates the power readings, statistical results, and trend graph in real time.

4.10 Save Images

Click the "" shortcut button on the menu bar to take a screenshot. By default, the image is saved in the "/bin/images" folder, and this storage path cannot be modified.

4.11 Minibar

The Minibar (Quick Parameter Bar) is used to display real-time power readings and provides quick access to commonly used measurement parameter settings. Users can view the current power value through the Minibar and quickly perform operations such as start/stop measurement, frequency setting, level offset adjustment, measurement window configuration, gate time setting, power unit selection, relative measurement, and sensor zeroing.

1. Click "" in the menu bar to enable Minibar mode;
2. Click "" to stop measurement, and click "" to start measurement;
3. Click the drop-down arrow "" to expand the parameter setting area and quickly configure the relevant measurement parameters. Click "" again to collapse the parameter setting area;
4. Click "Restore" to exit Minibar mode and return to the main interface.

Note: The setting methods, value ranges, and activation methods of parameters in Minibar are consistent with those in the Parameter Setting Panel. For detailed descriptions, please refer to the corresponding function sections.



Figure 5 Enable Minibar

5. Power Measurement Instructions

5.1 Parameter Description

Table 4 Power Measurement Parameter Description

Frequency	Set the frequency of the current signal under test.
Level Offset	Compensate for external attenuation or gain in the test path. Once set, the software adds the corresponding offset value to the measured results before displaying the power.
Window	Set the sliding time window for peak and average calculations. When the window is not yet full, calculations are based on the currently available data; once full, calculations are based on the data within the most recent window period.
Gate	Set the refresh interval of the power sensor measurement data
Power Unit	Set the power display unit to dBm or Watt.
Zero	Perform a zero calibration on the power sensor, reducing residual zero noise and zero offset in the absence of an input signal to improve low-power measurement accuracy.
Relative	When enabled, the software uses the real-time power reading at the moment of activation as a reference baseline, displaying the relative change of the current real-time power to this baseline.
Set to Ref	After relative measurement is enabled, click this button to update the current real-time power reading and lock it as the new reference value.
Statistics	When enabled, the power measurement trend window is displayed to show the power variation curves over the maximum time range, including the real-time power, average power, and peak power curves. When disabled, the statistical trend window is hidden.
Charts	
Scale/Div	Adjusts the display resolution of the vertical axis, setting the power variation represented by each division. For example, when set to 10 dB, each major vertical grid interval represents 10 dB.
Offset	Set the display upper limit of the trend chart's vertical axis relative to 0 dBm. A positive value offsets it upward relative to 0 dBm, and a negative value offsets it downward relative to 0 dBm.
ScaleReset	Restore the vertical scale of the trend chart to its default settings.
Max Time Range	Set the maximum time display range for the horizontal axis of the chart.

5.2 Operation Procedure

Taking the measurement of a 1 GHz, -20 dBm continuous wave (CW) signal as an example, the basic operation procedure for power measurement is as follows:

1. Connect the instrument:

   Connect the instrument correctly through the USB or ETH interface. After a successful connection, the software automatically enters the measurement state.

2. Zero the sensor:

   With no RF signal input, click "Zero" in the parameter setting area. If the message "Zero Completed" is displayed, the zeroing process is successful.

3. Connect the signal:

   Connect the CW signal under test to the RF input port of the instrument.

4. Configure parameters:

   Set the "Frequency" to 1 GHz in the parameter setting panel, and configure the level offset, measurement window, gate time, and power unit according to the test requirements. In this example, other parameters remain at their default settings.

5. Read absolute/relative measurement data:

   The software displays the current power measurement value in real time. To view the relative variation, click "Relative". The software uses the real-time power value at the time relative measurement is enabled as the reference value. To reset the reference value, click "Set to Ref".



Figure 6 Enable Relative Measurement

6. View the trend graph:

"Statistics" is enabled by default and can be used to view the power measurement trend graph. The trend graph displays the power variation curves within the time range specified by "Max Time Range", including the real-time value, average value, and peak value curves. Click the "☑" button before each curve to show or hide the corresponding curve in the chart.



Figure 7 Statistical Trend Display



6. SCPI Command Introduction

The PMA series average power sensors utilize the SCPI command protocol and support remote programming via a USB virtual serial port or LAN interface.

The USB virtual serial port is mapped to a COM port on the PC using the CP210x driver, with communication parameters configured to 115200 baud, 8 data bits, 1 stop bit, and no parity.

The LAN interface uses the TCP/IP protocol, with a default IP address of 192.168.1.101, a subnet mask of 255.255.255.0, a gateway of 192.168.0.1, and a default port number of 4001. SCPI commands are case-insensitive, and the command terminator is the newline character "\n".

6.1 Command Format Description

SCPI commands are case-insensitive. The following symbols are used in the command descriptions to indicate the command format:

1. **Angle brackets < >**

   Indicate parameters that must be entered by the user.

   For example: FREQ <val>, where <val> must be replaced with the actual frequency value, such as 1GHz or 100MHz.

2. **Square brackets [ ]**

   Indicate optional keywords or parameters that can be included or omitted.

   For example: FREQ? [MIN|MAX] means you can enter FREQ? to query the current frequency, or enter FREQ? MIN or FREQ? MAX to query the minimum or maximum value.

3. **Vertical bar |**

   Indicates a choice among multiple options.

   For example: FREQ? [MIN|MAX] indicates that the parameter can be set to either MIN or OFF.

4. **Question mark ?**

   Indicates a query command.

   For example: FREQ? queries the current frequency, and UNIT:POW? queries the current power unit.

6.2 Command Description

6.2.1 Device Information

Query Device Identification String	
Query	*IDN?
Example	*IDN?
Return	NULL,2697,V5.3,503406-4519-0-204
Remark	This command has no set form. The response consists of four comma-separated fields.

6.2.2 Reset

Reset Instrument	
Set	*RST
Example	*RST
Return	None

6.2.3 Clear Error Queue

Clear Error Queue	
Set	*CLS
Example	*CLS
Return	RETURN: *CLS:OK or RETURN: *CLS:FAIL

6.2.4 Frequency

Set or Query Frequency	
Query	FREQ? [MIN|MAX]
Set	FREQ <val>
Example	Query: FREQ? Query Return: RETURN: FREQ 10MHz Set: FREQ 1.00GHz Set Return: RETURN: FREQ 1.00GHZ: OK
Remark	<val> is a numeric string. Supported units include GHz, MHz or kHz. MIN is used to query the minimum frequency, MAX is used to query the maximum frequency. The actual frequency range is subject to the returned values.

6.2.5 Level Offset

Set or Query Level Offset	
Query	OFFS? [MIN|MAX]
Set	OFFS <val>
Example	Query: OFFS? Query return: RETURN: OFFS 0.00dB Set: OFFS 3dB Set return: RETURN: OFFS 3DB: OK
Remark	<val> is a numeric string, with dB as the unit. MIN is used to query the minimum offset value, and MAX is used to query the maximum offset value. The offset range is -100 dB to +100 dB.

6.2.6 Power Unit

Set or Query Power Unit	
Query	UNIT:POW?
Set	UNIT:POW <DBM|W>
Example	Query: UNIT:POW? Query return: RETURN:UNIT:POW DBM Set: UNIT:POW W Set return: RETURN:UNIT:POW W:OK
Remark	In the settings, DBM represents the logarithmic power unit (dBm), and W represents the linear power unit.

6.2.7 Relative Measurement

Set or Query Relative Measurement Status	
Query	REL?
Set	REL <ON|OFF>
Example	Query: REL? Query return: RETURN:REL OFF Set: REL ON Set return: RETURN:REL ON:OK
Remark	ON indicates that relative measurement is enabled. The reference value is the absolute measurement value at the moment relative measurement is enabled. OFF indicates that relative measurement is disabled. The instrument is in absolute measurement mode, and the reference value is set to 0.

6.2.8 Zero

Sensor Zeroing	
Query	Not supported
Set	CAL:ZERO
Example	Set: CAL:ZERO Set return: RETURN:CAL:ZERO:OK
Remark	After executing this command, the power sensor performs zeroing. Before execution, ensure that the input port of the power sensor is connected to the device under test. The host computer should wait for the return result and display the corresponding operation prompt according to OK or FAIL.

6.2.9 Measurement Value

Query Absolute or Relative Measurement Value		
Query	READ?	Query absolute measurement value
	READ:REL?	Query relative measurement value
Set	Not supported	
Example	Query absolute power: READ? Query return: RETURN:READ -20.99dBm Query relative power: READ:REL? Query return: RETURN:READ:REL -0.99dB	
Remark	READ? is used to query the absolute measurement value, and the returned unit is determined by the UNIT:POW setting (dBm or Watt); READ:REL? is used to query the relative measurement value, with the unit in dB.	

6.2.10 Measurement Time

Query or Set Measurement time	
Query	GATE?
Set	GATE <val>
Example	Query: GATE? Query return: RETURN:GATE 1000mS Set: GATE 500mS Set return: RETURN:GATE 500MS:OK
Remark	<val> is a numeric string, with ms (milliseconds) as the unit. GATE is used to set the refresh interval of the power sensor measurement data; within a single Gate cycle, multiple executions of READ? will return the same cached measurement value.

6.2.11 Network Parameters

Set or Query Network Parameters		
Query	COMM:LAN:PORT?	Query the port number
	COMM:LAN:IP?	Query the IP address
	COMM:LAN:SUBN?	Query the subnet mask
	COMM:LAN:GATE?	Query the gateway
Set	COMM:LAN:DEF	Restores default parameters
	COMM:LAN:PORT <val>	Set the port number
	COMM:LAN:IP <val>	Set the IP address
	COMM:LAN:SUBN <val>	Set the subnet mask
	COMM:LAN:GATE <val>	Set the gateway
Example	Set IP Address: COMM:LAN:IP 192.168.1.216 Query IP Address: COMM:LAN:IP? Query return: 192.168.1.216	
Remark	Default configuration-IP address: 192.168.1.101, subnet mask: 255.255.255.0, gateway: 192.168.0.1, port: 4001. When configuring, <val> must be set to the string format corresponding to each command.	

6.2.12 Error Query

Query Error Information	
Query	SYST:ERR?
Set	Not supported
Example	Query: SYST:ERR? Query return: 0,"No Error"

6.3 Command Examples

6.3.1 Absolute Power Measurement

- *IDN? // Query device information
- CAL:ZERO // Perform zeroing
- FREQ 1GHz // Set the measurement frequency to 1 GHz
- UNIT:POW DBM // Set the power unit to dBm
- GATE 5mS // Set the gate time
- READ? // Query the absolute power measurement value

6.3.2 Relative Power Measurement

- *IDN? // Query device information
- CAL:ZERO // Perform zeroing
- FREQ 1GHz // Set the measurement frequency to 1 GHz
- UNIT:POW DBM // Set the power unit to dBm
- GATE 5mS // Set the gate time
- REL ON // Enable relative measurement
- READ:REL? // Query the relative power measurement value

6.3.3 Network Parameter Configuration

- COMM:LAN:PORT? // Query the port number
- COMM:LAN:IP? // Query the IP address
- COMM:LAN:SUBN? // Query the subnet mask
- COMM:LAN:GATE? // Query the gateway
- COMM:LAN:IP 192.168.1.216 // Set the IP address
- COMM:LAN:PORT 4002 // Set the communication port
- COMM:LAN:IP? // Query the modified IP address

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