

PNFA Monitor – Software Manual

Portable Near Field Analyzer / Power meter 1 MHz to 4 GHz

PNFA Monitor displays PNFA RF levels, compares filter bands, records time histories and exports measurement records on a Windows computer. This manual describes the implemented software interface and how to use its results in a repeatable measurement workflow.

Connect PNFA by USB and select its COM port in the application. The PNFA display shows "REMOTE" while software control is active. This manual covers software operation only; refer to the hardware User Manual for instrument operation and applicable RF input limits.

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1 Connection and session setup

Installation process

The installer targets compatible 64-bit Windows and installs per user without an administrator requirement, normally under %LOCALAPPDATA%\Programs\EMCgear\PNFA Monitor. It creates an EMCgear Start menu entry and offers a desktop shortcut.

Start remote measurement

1. Connect PNFA to the computer with a USB data cable. Start PNFA Monitor.
2. In PNFA connection, choose the instrument's COM port. Use Refresh ports after connecting a device if the port is not listed. COM3 was used for the illustrated session; Windows may assign a different number.
3. Select Connect. Verify Connected Yes, the displayed SN and changing measurements. In the connected state the port selector and Refresh ports are hidden and the button becomes Disconnect.
4. Confirm that the PNFA display shows REMOTE. Select the required measurement tab and review frequency, attenuation, math mode, units and logging before recording.

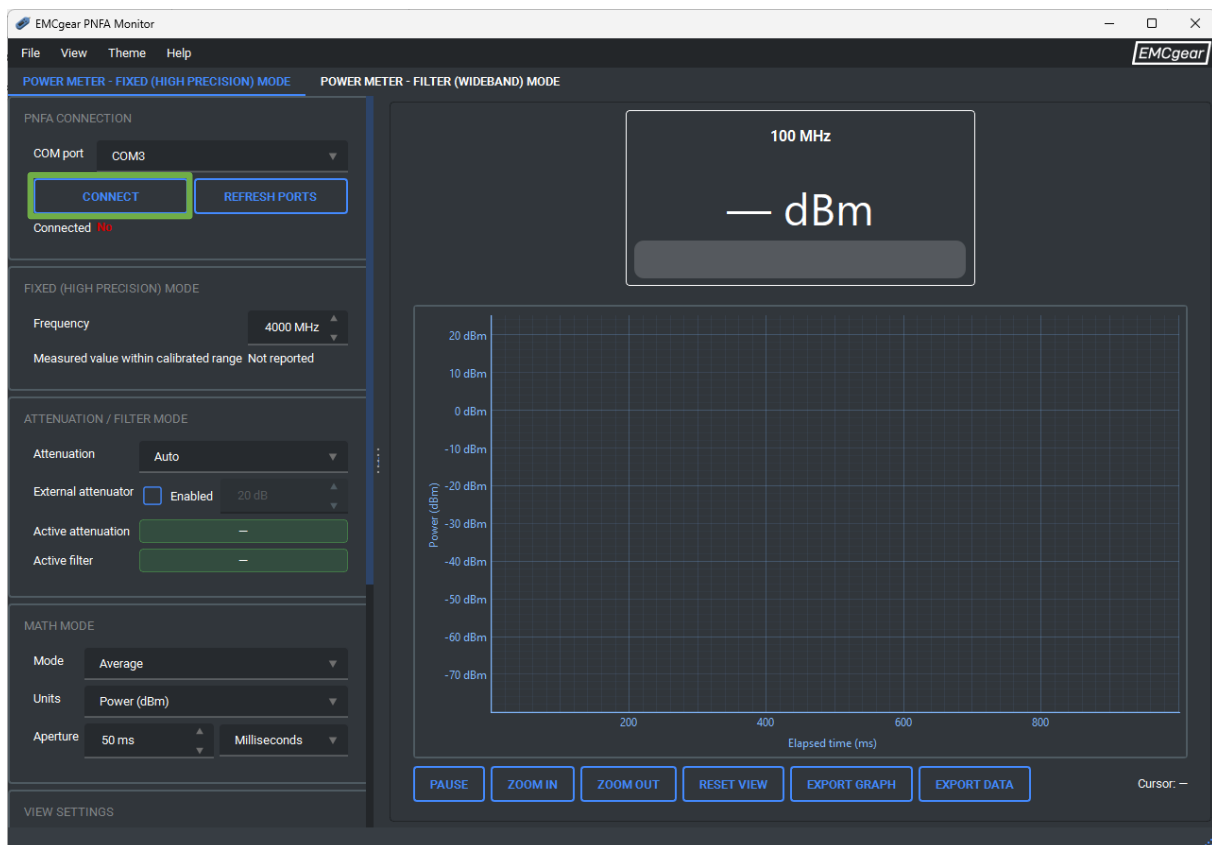


Figure 1. Actual application before connection, with COM3 selected. Example retained settings.

USB and the serial port provide the transport; the software also requests remote operation. Opening the port alone does not establish an active measurement session. In Fixed mode the software waits for the firmware to confirm that mode. If activation is not confirmed, resolve the status message before using the readings.

At the end, disable logging, save required data or a workspace, then select Disconnect. Closing the application stops its reader and logging and saves selected settings; it does not automatically preserve the measurement history.

2 Fixed high precision mode

Select Power meter - Fixed (high precision) mode for a signal with a known frequency. One numeric card and one graph show the selected measurement. Switching between measurement tabs clears the histories in both modes; save records first.

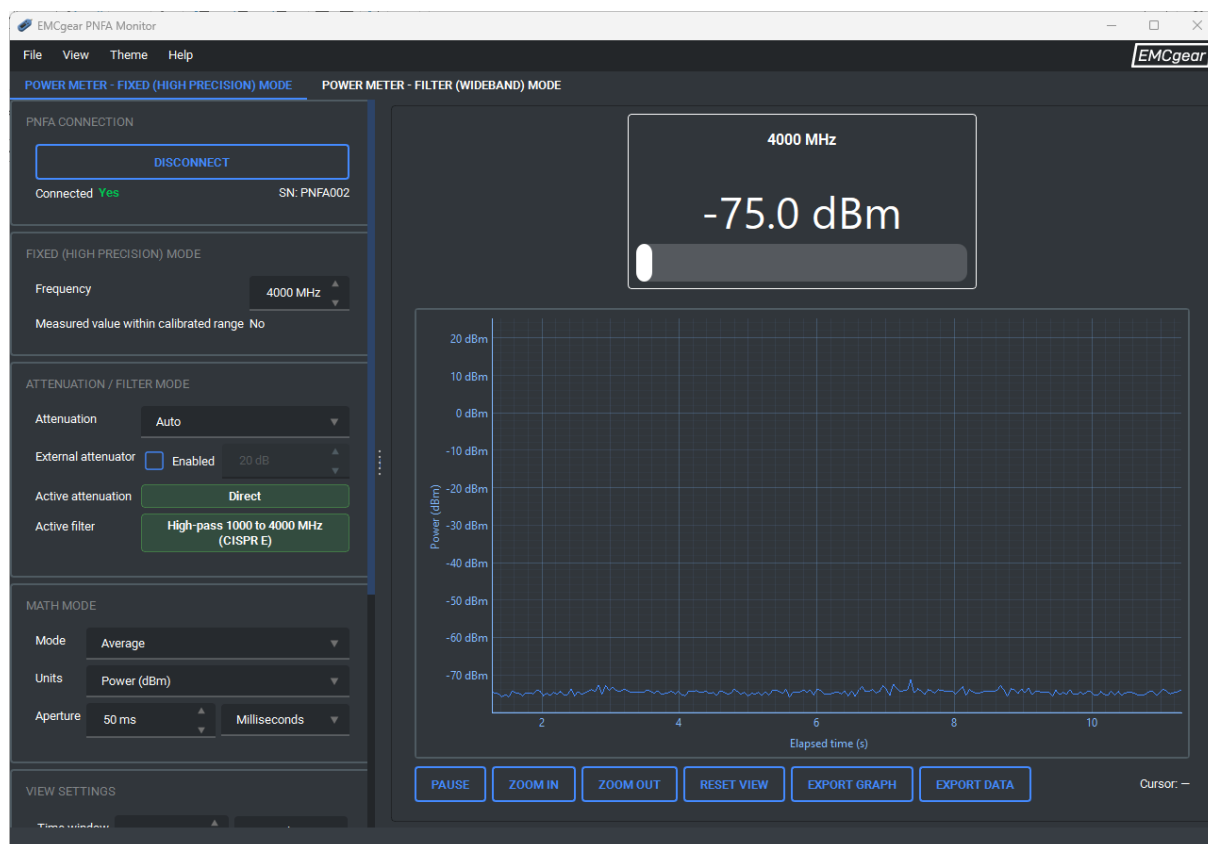


Figure 2. Live Fixed mode at 4000 MHz, connected to PNFA002 on COM3. The reported calibrated-range state is No.

Control or indication	Implemented behaviour
Frequency	Whole MHz from 1 to 4000, in 1 MHz steps. A value change is sent immediately; there is no Apply button.
Main card	Frequency, reading, selected unit and level bar. (CAL) appears when firmware reports the result within its calibrated range.
Measured value within calibrated range	Yes, No or Not reported, according to firmware information. Not reported means the status is unavailable.
Active filter	The filter reported by PNFA for the selected frequency. It is not a manually selectable filter in this screen.

Enter the actual signal frequency so PNFA can apply frequency-dependent correction and choose its filter. This does not tune a narrowband receiver: other energy in the selected band may contribute. Reported frequency or filter changes reset the history to avoid mixing measurement contexts.

The calibrated-range indication does not verify the entered frequency, the complete RF setup or input safety. Missing values appear as a dash; OVERRANGE is highlighted in red. Do not interpret an invalid result as zero.

3 Filter wideband mode

Select Power meter - Filter (wideband) mode to compare the four filter paths. Each displayed filter has a numeric card, a level bar and a corresponding time graph. Scroll the settings pane when controls extend below the window.

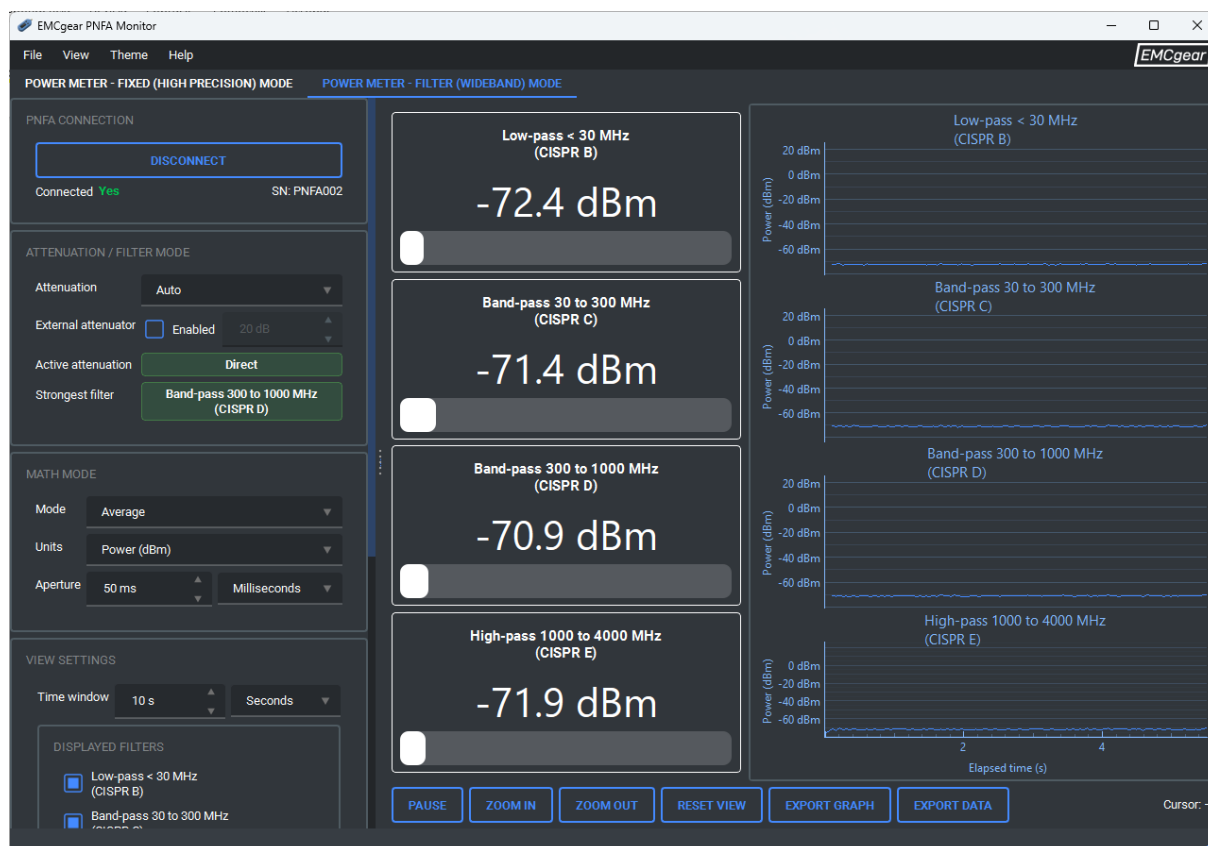


Figure 3. Live Filter mode with all four bands displayed. Full data stream logging is enabled.

Screen label	Nominal range
Low-pass < 30 MHz (CISPR B)	Below 30 MHz within the PNFA operating range
Band-pass 30 to 300 MHz (CISPR C)	30–300 MHz
Band-pass 300 to 1000 MHz (CISPR D)	300–1000 MHz
High-pass 1000 to 4000 MHz (CISPR E)	1000–4000 MHz

Displayed filters checkboxes show or hide each card and graph. Hiding a band does not stop its acquisition and does not remove it from Full data stream or Graph data only logging. EXPORT DATA includes only the selected visible bands.

Strongest filter compares the finite processed readings of the checked bands. In Max hold it therefore compares held maxima. With no eligible displayed reading, it shows a dash. It does not identify an exact frequency, sum the bands or establish simultaneous sampling. The CISPR labels identify nominal bands, not compliance-test capability.

4 Attenuation and measurement status

Attenuation / Filter mode separates the requested setting from Active attenuation, which reports the instrument's active path. Check the readback before comparing or recording levels. Controls are synchronized between the two measurement tabs.

Attenuation choice	Use and meaning
Auto	Allow PNFA to select the direct or internal-attenuator path as levels change. Record active-path changes when interpreting a trace.
Direct	Request the direct internal path. Choose only for a suitable RF input level.
Internal attenuator	Request the internal attenuator path. This is the exact software label.

External attenuator compensation

Under External attenuator, enter the attenuation of the physical external component and select Enabled. The editor accepts 0–100 dB in 1 dB steps. A displayed number is not applied when Enabled is clear.

Enabling compensation disables the normal attenuation selector and requests the internal attenuator together with the external correction. Active attenuation reports Internal + external (N dB). Clearing Enabled restores the previously selected normal attenuation mode.

Firmware applies the compensation to reported levels; PNFA Monitor does not add the same correction again. The graph limits shift by the change in enabled external attenuation while retaining their span. Disabling compensation shifts them back.

For example, a physical 20 dB attenuator with 20 dB compensation refers the reading toward the input of that attenuator. Actual frequency-dependent loss, cable loss and the rest of the setup still matter. A software correction supplies no physical input protection.

Invalid readings and switching

OVERRANGE marks a result outside the usable measurement condition. It can affect the numeric card, level bar and graph indication. Reduce the RF level or review the measurement setup using the applicable hardware ratings; a calibrated indication is not an input rating.

Samples marked as gain transitions are excluded from the live cards and graphs while the path settles. Full data stream logging retains these frames with gain transition, so downstream analysis must account for the flag. Missing band values remain blank in saved numerical data.

Repeatable comparisons

Keep requested attenuation, external correction and the physical setup consistent. With Auto, note the active path as well. Recheck external compensation after restarting the application; automatic settings restore is not a complete measurement setup restore. Save a workspace if the context must be retained explicitly.

5 Math mode and units

Math mode processing runs in the PC. Mode, Units, Aperture and Time window are synchronized between the two measurement workspaces. Do not assume that each tab keeps independent processing settings.

Mode	Numeric reading and history
Sample	Latest valid incoming sample. Suitable for immediate changes; graph history is subject to its point limit.
Average	Sliding average of valid dBm samples over Aperture. This is an average in dBm, not an arithmetic average of watts.
Peak	Sliding maximum over Aperture. It is not a sequence of independent, non-overlapping peak intervals.
Max hold	Highest valid value since reset or a context change. The card and bar hold that value; the graph continues to show changing values, with held maxima indicated by dashed lines.

Aperture and resetting

Aperture is shown for Average and Peak. It accepts a minimum of 2 ms and offers milliseconds, seconds, minutes, hours and days. This time interval controls processing; its reciprocal is not the instrument sampling rate. Graph emission is also limited by the aperture and available history capacity.

Mode or aperture changes can clear the histories. In Max hold, Reset max. clears the held maxima and held overrange state without clearing the graph. Save a comparison before changing its measurement context.

Units

Units choice	Meaning
Power (dBm)	Logarithmic power relative to 1 mW.
Power (Watt)	Equivalent power, displayed with an appropriate engineering prefix.
Voltage (Vrms)	Calculated RMS voltage for a 50 Ω reference.
Current (Irms)	Calculated RMS current for a 50 Ω reference.

With P in watts, $V_{rms} = \sqrt{P \times 50 \Omega}$ and $I_{rms} = \sqrt{P / 50 \Omega}$. For example, 0 dBm is 1 mW, approximately 0.224 Vrms and 4.47 mArms. Voltage and current are calculated equivalents, not separate direct measurements.

Units changes numeric readings, cursor values, graph labels and EXPORT DATA values. Graph positions retain the internal dBm spacing; a watt-labelled view is not a linear-watt scale. Axis limit editors remain in dBm. CSV logging remains in dBm regardless of the selected display unit.

6 Time graphs and display controls

Time window sets the retained/displayed interval, with Seconds, Minutes, Hours or Days and a minimum of 0.1 s. Changing the time unit preserves the duration. Increasing the window cannot recover points already discarded.

Control	Effect
Pause / Resume	Pause stops new card, math and graph processing. USB reception continues. Resume accepts new samples; it does not replay a backlog. The paused interval is omitted from graph elapsed time.
Zoom in / Zoom out	Step through configured time spans and update Time window. They do not change the RF frequency.
Reset view	Restore following the latest configured time span. It does not clear history, reset Max hold or restore attenuation and vertical limits.
Cursor	Move over a plotted point to inspect the band, time and value. Crosshairs and the readout refer to the plotted data.
Mouse navigation	Drag to pan the plot and use the wheel to zoom. Reset view returns to following the current data.

History capacity

Each graph is limited to 50,000 points. With the nominal Sample-mode budget of 700 points/s, the software limits the Sample time window to about 71.42 s. Requesting a longer window can switch to Average and increase Aperture. Selecting Sample with a longer window shortens the window.

For Average and Peak, the application may increase Aperture to fit the requested window. Max hold still evaluates valid incoming samples for its maximum even when plotted points are reduced. Review the resulting Mode and Aperture after changing the time window; screen redraw speed is not acquisition rate.

Axis scale settings

Expand Axis scale settings to edit Min and Max for each graph. The editors use dBm, accept –200 to +200 dBm and show 0.1 dB precision. Auto Scale fits retained finite data with padding. Default Value restores –80 to +25 dBm, shifted by enabled external correction. Use the same vertical limits for visual comparisons.

Layout

View offers Numeric bar only, Graph only and Numeric bar + graph. Numeric bar size offers Adaptive (recommended), Compact and Large. These choices apply to both modes. Hiding graphs does not stop measurement processing.

Click or drag the dotted divider to collapse or expand the settings pane; it is a collapse control, not a freely resizable divider. When focused, Left or minus collapses it, Right or plus expands it, and Space or Enter toggles it.

During Pause, Graph data only logging also stops receiving points. Full data stream logging can continue. Choose the logging mode deliberately before using Pause in a recorded session.

7 CSV logging

1. Choose the measurement tab and set Log directory, or select Browse... to choose a folder. Check that the location is writable.
2. Choose Data to log: Full data stream or Graph data only. Select Enable CSV logging and verify the filename in the status field.
3. Clear Enable CSV logging to finish and flush the file. Check a short trial file before a long recording. Changing directory or logging type while enabled starts a new file.

Behaviour	Full data stream	Graph data only
Saved values	Received frame values in dBm	Processed graph points in dBm
Hidden filter bands	Included	Included
Pause	Continues receiving raw frames	No new graph rows
Gain transitions	Retained with flag	Excluded from processing
Coverage	Active measurement mode	Active measurement mode

Files use UTF-8 with a BOM and comma-separated columns. Names begin PNFA_LOG_Wideband_ or PNFA_LOG_HighPrecision_, followed by a timestamp including milliseconds. Logging is periodically flushed and closed on stop. A mode switch clears histories and routes samples to the selected mode; do not expect an inactive tab's log to keep receiving its previous measurement.

Full data stream columns

datetime, monotonic_s, seq, mode, frequency_mhz, pnfa_filter, gain_path, overrange, gain_transition, lp_dbm, bp1_dbm, bp2_dbm, hp_dbm

Band columns hold firmware-reported values, including its applied correction. Non-measured or invalid bands are blank. Use gain_path, overrange and gain_transition to qualify records rather than treating every row as a valid measurement. seq supports continuity checks.

Graph data only columns

Wideband: datetime, elapsed_s, mode, gain_path, overrange, lp_dbm, bp1_dbm, bp2_dbm, hp_dbm

Fixed: datetime, elapsed_s, mode, frequency_mhz, pnfa_filter, gain_path, overrange, value_dbm

These rows follow processed graph output and its reduction, rather than every received frame. The wideband overrange field represents a combined indication. In Max hold, graph values remain the changing trace values; do not treat the CSV as a separate archive of held maxima.

Time and traceability

datetime is computer local time with milliseconds; monotonic_s is the computer's monotonic timestamp, not seconds since the file opened. Graph elapsed_s follows graph timing and omits Pause intervals. These are not calibrated hardware timestamps. Keep serial number, firmware, frequency, attenuation, probe setup and processing settings with the file because CSV is not a complete setup record.

8 Exporting and saving workspaces

EXPORT DATA

Use EXPORT DATA to save the visible time range and selected filter bands as CSV. This exports retained, processed plot data, not the complete received stream. Defaults are PNFA_Wideband_Data.csv and PNFA_HighPrecision_Data.csv. Save before switching modes or changing settings that clear history.

The first column is elapsed_time_s. Band columns use identifiers such as LP, BP1, BP2 and HP with a unit suffix. Values use the selected base unit dBm, W, V or A; they are not the engineering-prefixed strings on the cards. Invalid values are blank. In Max hold, this exports the changing trace, not only the held maximum.

EXPORT GRAPH

Use EXPORT GRAPH for a clean plot rendering of the visible range, vertical scales and selected panels. It does not capture the complete application window or numeric cards. PNG output is 1800 × 1200 pixels; PDF uses an A4 landscape page and a 300 dpi writer setting.

The export dialog offers diagnostic information, checked by default. It includes available mode, serial number, timing and sample statistics, processing/units, attenuation and frequency/filter context. Clear it for a plot without that diagnostic block. Review the saved file and its selected time range; no visible data produces a warning.

Save and load a workspace

File → Save workspace... (Ctrl+S) writes a .pnfa workspace. File → Load workspace... (Ctrl+O) restores one. Save the current work before loading another workspace because loading replaces the working context.

A workspace retains the two plot histories still in memory, processing and Max hold state, graph views and scales, visibility, frequency, attenuation and external correction, theme, layout and log directories. It does not contain the complete separately recorded streaming CSV files.

Automatic settings restore

The application stores selected preferences in pnfa_workspaces.ini under %LOCALAPPDATA%\PNFA-ROARM-GUI. These include display and processing settings, frequency, filter visibility, axes and time window. Automatic restore is not a saved measurement: history is not restored and logging is not automatically restarted.

Recheck external attenuation and all measurement settings after a restart. Use an explicitly saved workspace and accompanying CSV when both context and recorded results need to be preserved.

A useful record set

Keep the CSV for numerical analysis, an exported graph for the selected comparison and a workspace for revisiting the retained view. Add a short setup note with device identity, signal frequency or band, attenuation, probe/cable details, orientation, spacing and the change being evaluated. Do not substitute the screenshot's example settings for your setup.

9 Menus and diagnostics

Menu	Available Monitor commands
File	Load workspace... (Ctrl+O); Save workspace... (Ctrl+S).
View	Numeric bar only; Graph only; Numeric bar + graph. Numeric bar size: Adaptive (recommended), Compact, Large.
Theme	Dark and Classic. Theme applies to the application and is retained in settings.
Help	User manual (F1); Analyzer information; Show debug information; About.

Analyzer information (for error reporting purposes)

Open Help → Analyzer information to request current instrument information and view the available connection and diagnostic fields. Use Export to save a text report, Copy to clipboard to copy it, or Close to return to the measurement window.

Information group	What to check
Connection and identity	Connection state, COM port, baud rate, serial number, hardware revision and firmware version/date when reported.
Analyzer mode and attenuation	Reported mode, frequency/filter and attenuation context. Use this to check the measurement configuration.
Calibration	Availability and entry information supplied by firmware. Missing information is shown as Not reported.
Telemetry	Sample rate, error/sequence diagnostics, overrange and gain-transition information, and the last response.

Not reported identifies unavailable information; it is not a negative measurement result. Include the report with a support request so the device and firmware can be identified without interpreting a screenshot alone.

Debug information (for error reporting purposes)

Help → Show debug information reveals Status, RX total, RX err, Rate, SEQ, Message timing and Last sample. Use these fields to distinguish a connected but idle session from one receiving measurements or reporting communication errors. The panel is normally hidden.

Help and theme behaviour

User manual (F1) opens the bundled software manual (this document)

About identifies application version 1.0.0 in the inspected implementation and the support address emcgear@emcgear.com.

Note: Avoid changing GUI themes during a timing-sensitive recording because rebuilding the view temporarily interrupts GUI processing.

10 Practical measurement workflows

Track a known-frequency source

1. Connect and verify serial number and current measurements. Select Fixed mode and enter the known frequency in MHz.
2. Review Active filter, Active attenuation and the calibrated-range status. Match external compensation to the physical setup if used.
3. Use Sample for immediate changes, Average for a smoother trend or Peak to inspect maxima within a sliding interval. Choose an aperture suited to the event and record it.
4. Set a useful time window and fixed vertical limits. Start the chosen CSV log before the event. Keep the setup and frequency unchanged during a comparison.
5. Stop logging and export the useful time range. Save a workspace if you need to revisit the history and settings.

Locate an emission with a near-field probe

1. Select Filter mode and initially display all four bands. Compare readings and Strongest filter to decide which broad band deserves attention.
2. Keep probe distance and orientation repeatable as you compare locations. A level change can come from coupling as well as a source change; note the geometry.
3. Hide unwanted plots only to simplify the display. Remember that both logging choices still include hidden bands, while EXPORT DATA follows the visible selection.
4. For a before/after modification, keep math mode, aperture, attenuation, cabling and scales unchanged. Export or save the first result before a change that clears history.

Capture intermittent activity

Max hold helps retain the highest observed valid reading. Select Reset max. immediately before the test interval; use the continuing graph to see how levels evolve. Full data stream logging preserves received frames for subsequent review, including flags that must be filtered during analysis.

A large aperture or reduced graph output can hide short visual details. Keep the raw log when those details matter. Neither a faster screen update nor a selected 2 ms aperture proves a particular effective RF time resolution.

Review a running trace

Pause freezes new display processing so a retained trace can be examined with the cursor. Full data stream can continue recording; Graph data only does not. Resume starts accepting current samples again. If wall-clock continuity matters, use the full log's timestamps rather than graph elapsed time.

11 Troubleshooting

Symptom	Checks and next action
COM port missing	Use a USB data cable, check the computer connection, then Refresh ports. Verify enumeration in Windows. The correct release driver package remains a release-specific item.
Connect fails	Check the selected port and whether another application owns it. Close the competing connection, refresh and retry. Review the status/debug message.
Fixed mode not confirmed	Wait for mode confirmation. If "Fixed (high precision) mode activation was not confirmed by PNFA." appears, check firmware information and reconnect before using the readings.
Connected but values stopped	Check whether Pause is active, the selected mode and debug RX/Last sample fields. A connection indicator alone does not prove a fresh measurement.
No or Not reported calibration	Check frequency and firmware information. No is a reported state; Not reported means unavailable. Do not infer a calibrated absolute result.
OVERRANGE	Review the RF level, attenuation and physical setup using applicable hardware input limits. Exclude invalid values from comparisons.
History disappeared	Mode, frequency/filter, math or aperture changes can clear history. Time and point limits discard older points. Use earlier CSV/workspace records; expanding the window cannot recreate data.
Sample changed to Average	The requested time window exceeded the point budget. Review the automatically adjusted mode/aperture or shorten the window.
CSV differs from the screen	Full logging stores received dBm frames; graph logging stores processed dBm points; EXPORT DATA uses selected units/range/bands. Pause and hidden-band rules differ.
Logging error or no file	Check the chosen folder and status message, stop/restart logging and verify a short file. A folder or logging-type change creates another file.
Frequency card disagrees with editor	A stale frequency title was observed during this review. Re-enter the intended frequency and compare Analyzer information before recording; see the release checks.
F1 cannot find the manual	The packaged PDF resource is missing. Use the supplied documentation and report the packaging issue.

Prepare a useful support report

Include application version, Analyzer information export, exact symptom, selected mode/frequency, attenuation, processing settings and a short relevant CSV excerpt. Describe whether Pause, a mode switch or a settings change occurred. The support address in About is emcgear@emcgear.com.