



NeuroPype Signal Quality Check

NeuroPype Signal Quality Check is a Plug-In for CGX Flowpoint that analyzes EEG files created by any CGX Quick Series device. This Plug-In is created by Intheon and powered by its NeuroPype platform. CGX Flowpoint is a Windows-based application to acquire, view, record, and play back EEG recordings.

Note

- This is investigational software designed for research and development efforts.
- It is not an FDA-approved medical device.
- There are no known side effects from the use of this product.

Description

Signal Quality Check is an EEG signal quality assessment plug-in. It assists researchers in evaluating the integrity of EEG channels after data acquisition. The plug-in provides an intuitive overview of key quality metrics, including:

Good/Bad Channel Overview A high level overview of each channel's quality based on channel correlation and high-frequency noise measurements.

Artifact Ratio Calculates the proportion of data segments contaminated by artifacts.

Channel Correlation Measures the similarity between a channel and its neighbors to detect disconnected or noisy electrodes.

High-Frequency Noise Quantifies the presence of high-frequency artifacts, often indicative of muscle activity or external interference.

Line Noise Assesses the level of power line interference (e.g., 50/60 Hz).

These metrics are computed automatically and can be visualized to identify underperforming or noisy channels, facilitating immediate corrective actions.

This signal quality report also includes a plot showing spectral power per electrode over time, and a time course showing the raw EEG per electrode. This Plug-In supports .EDF and .CSV files formats.

Learn more about [NeuroPype](#).

This Device Is Intended For Research Only.

It Is Not Intended For The Following Uses:

- monitoring of patients in a clinical environment
- use in medical diagnosis

System Requirements

- The NeuroPype Signal Quality Check reads files recorded by a CGX Quick Series system
- The NeuroPype Signal Quality Check is a Plug-In running in CGX Flowpoint

Recommended Minimum Computer System Specifications

- 16GB of RAM
- Intel Core i5-3300 or equivalent
- Windows 10 (x64) version 1809 or later (including Windows 11 (x64)).

Plug-In Installation

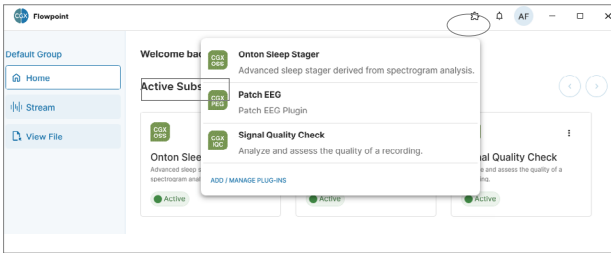
Download The Software

Note: You will need a CGX account, and Flowpoint software to run the NeuroPype Signal Quality Check.

- Log out of Flowpoint if it is open, and

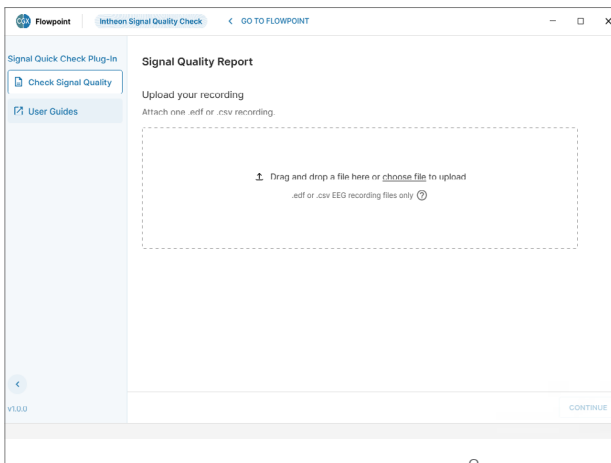
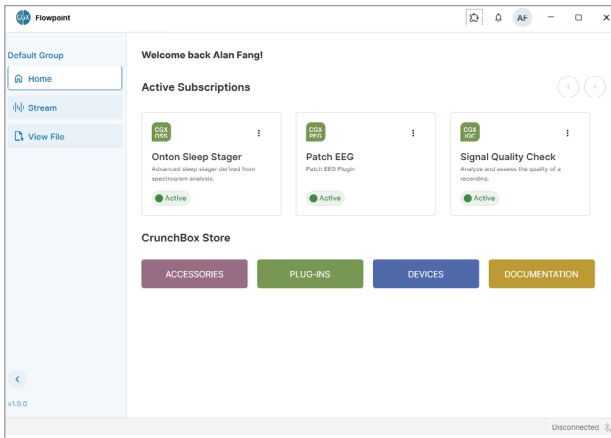
navigate to CGXSystems.com

- Select **CrunchBox** from the navigation menu.
- Select and purchase the **NeuroPype Signal Quality Check**
- Open Flowpoint. The Plug-In will be available for use.



Open Flowpoint

The NeuroPype Signal Quality Check will be available in the Plug-Ins drop-down menu on the Home page.

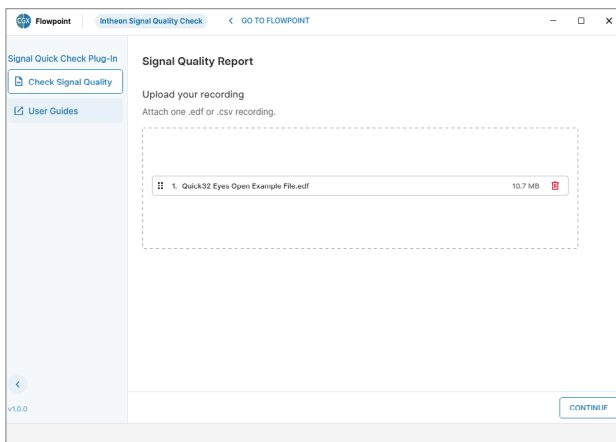


Attach File

Either drag or select an .EDF or .CSV recording created with a CGX Quick-series system

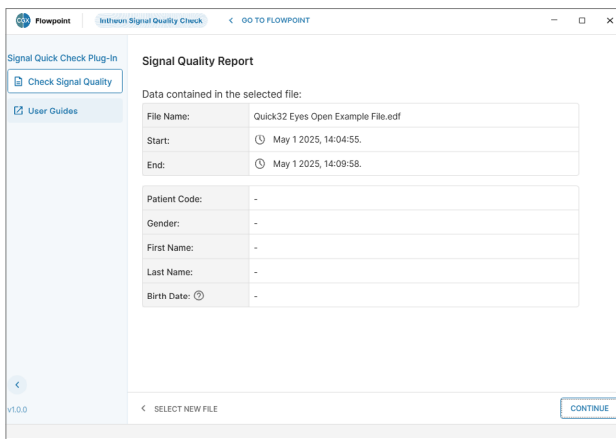
See the CGX device User Guide for additional information.

Running A Signal Quality Check



Confirm File

Note: The Signal Check Plug-In currently only accepts files up to 60 minutes. You will see an error message if the selected file is not compatible.



Signal Quality Report

Report Details:

Individual Name

Trim recording (Optional):

Start Trim in seconds: 15

End Time in seconds: 303

Duration after trim: 288 seconds

Power line frequency selection: 60 Hz

GENERATE REPORT

Power line frequency selection

Intheon Signal Quality Check Plugin can automatically detect the power line frequency in the recording. However, if you know the power line frequency, please select it here.

Countries Using 50 Hz Powerline Frequency

Most of Europe, Asia, Africa, and parts of South America

Afghanistan
Albania
Algeria
Angola
Argentina
Armenia
Austria
Bangladesh
Belgium
Bhutan
Bolivia

CLOSE

Trim Recording (Optional)

Cutting noisy data from the start or end of a recording helps ensure that metrics reflect meaningful EEG, not cap donning or doffing artifacts.

Trimming

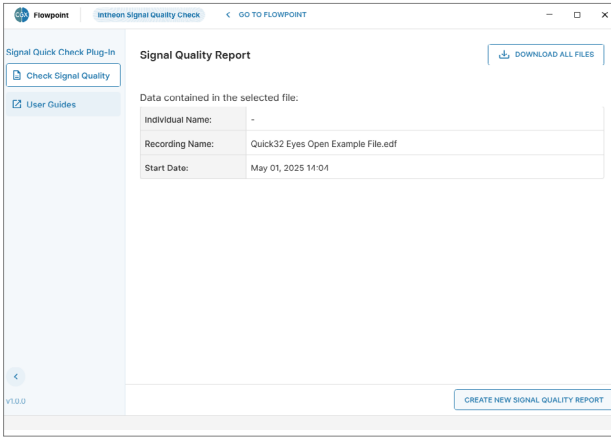
- Improves accuracy of quality scores
- Reduces false artifact flags
- Keeps your report focused on usable data. This avoids letting irrelevant tail-end data to dilute session quality scores.

Set Your Line Frequency

When uploading your EEG file, you'll be asked to select the power line frequency in your region — either 50 Hz or 60 Hz. This ensures the Line Noise metric evaluates the correct interference band.

If you're unsure, hover over the question mark icon in the select interface to access a reference map.

Note Selecting the wrong frequency may lead to under- or overestimation of electrical interference in your report.



Report

The system will generate a report as a background service. You can continue working as the report is generated.

Download Report

When the system has completed processing the report, the **Download All Files** button will appear.

The system generates two files: an interactive HTML report and a .CSV table listing all metrics.

HTML File

This is an interactive file including topoplots, quantitative metrics, and other graphs pinpointing artifacts.

CSV File

This is a CSV file listing metrics for all artifact types analyzed in the report for all channels.

Signal Quality Check Report Quick Reference

The NeuroPype Signal Check report helps you determine EEG signal quality by evaluating key metrics across all channels.

1. Good/Bad Channel Summary

Green = Good

High channel correlation and low noise

Red = Bad

At least one metric indicates poor signal

This is your starting point to assess whether the overall recording is usable or if major quality issues exist. A mostly green map means minimal intervention is needed, while clusters of red may indicate hardware or setup problems.

2. Artifact Ratio

Low Ratio = clean signal

High Ratio = frequent or large artifacts

Artifact-heavy recordings reduce the time available for meaningful analysis and may skew results. Identifying these areas early allows better trimming or re-recording decisions.

3. Correlation Metrics

Session-Wide Consistency

Measures dropouts over time

> 0.8 = stable

< 0.6 = poor contact or interference

Local Signal Reliability

Compares each channel to neighbors

> 0.8 = clean

< 0.6 = poor spatial integrity

These metrics reveal if a channel was stable throughout the session (global consistency) and if it meaningfully captured neural activity in its region (local correlation).

4. Noise Metrics

High Frequency Noise

Z-score of 60+ Hz power

> 1.5 = muscle/EMI artifacts.

Line Noise

Ratio of 45–55 Hz power to baseline

> 2.5 = strong mains interference.

Noise not only degrades signal but can falsely elevate band power readings. Knowing when and where it occurs lets you refine pre-processing or adjust future setups.

Good/Bad Channel Overview

This section provides a visual binary classification of each EEG channel. The system flags channels based on whether both correlation and high-frequency noise meet acceptable thresholds.

Why It Matters

This overview acts as your diagnostic dashboard. It helps identify whether problems are isolated to a few electrodes or if the session suffers from global quality issues. A mostly green scalp map indicates a high-quality recording that can likely move straight into analysis. Red dots invite closer inspection of individual metrics.

How to Use It

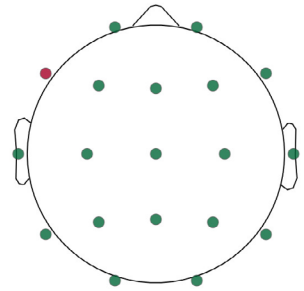
Look for clusters of red (e.g., frontal or occipital), which may suggest region-specific issues like blinking or hair obstruction.

Use this to prioritize which channels to review or exclude.

How to Improve Score

- Inspect Artifact Overtime plot to determine if trimming is necessary and rerun the report.
- Lower the impedance of each channel.
- Determine the source of noise by looking at the high frequency and line noise plot.
- If the line noise plot shows significant artifacts, try recording at an electrically cleaner environment. Subject should be away from power cords. Close lighting (an old standing lamp) can also introduce noise.
- If the high frequency plot shows significant artifacts around the occipital and temporal region, it might be caused by muscle movement. Ask the subject to relax shoulder muscles by light stretches and adjusting posture. Relax jaw muscle by opening the mouth and closing a few times before recording.

Good/Bad Channel Overview



Artifact to Clean EEG Ratio

This metric shows the relative strength of non-brain signal contamination (artifact) compared to clean EEG.

Why It Matters

Artifact-heavy data complicates preprocessing, and can degrade classifier performance or statistical outcomes. This ratio directly impacts data yield and interpretability.

How to Use It

Channels with high artifact ratios should be visually inspected.

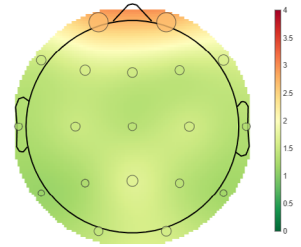
Use the topoplot to assess spatial trends (e.g., jaw/muscle tension may affect lateral channels).

How to Improve Score

Use the High Frequency Noise and Line noise to raw EEG ratio to determine source of the artifact; whether if the noise is power line vs. other higher frequency artifacts.

Use the Artifact Over Time plot to identify when noise is most disruptive. Re-running with trimming can help isolate clean data.

Artifact To Clean EEG Ratio



Artifact Over Time

This plot highlights the differences between the original raw EEG data and a version that has undergone artifact removal for comparison purposes only. It is important to note the cleaned EEG data shown here is not saved; the raw data remains unchanged. This visualization is solely used to illustrate artifact presence and to calculate the Artifact Over Time plot.

Why It Matters

This plot helps contextualize when artifacts occurred in the session and supports decisions about trimming. It also demonstrates the value of artifact removal as performed by a separate cleaning tool.

How to Use It

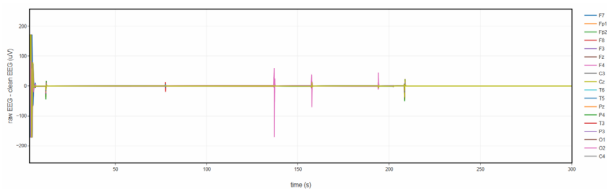
Use spikes in the plot to identify noisy time periods.

If early or late segments show excessive deviation, consider trimming them and re-running the analysis.

Interested in deeper cleaning? The NeuroPype signal Boost Plug-In can repair noisy files. This comparison is based on algorithms similar to those used in the Signal Boost cleaning plugin — ask us how to integrate them into your workflow.

Use this to justify trimming the recording interval.

Artifact To Clean EEG Ratio



The plot is interactive in the HTML report. User can show/hide individual channels by toggle clicking the channels in the legend. The line graph can be zoomed in and out in place which can be helpful when trying to individually examine specific lines.

Understanding The Reports: Details

This graph provides a visual indication of which data segments are likely to remain unusable even after artifact removal. It is intended purely for quality control purposes.

Importantly, the raw EEG data itself is not altered by this display. It simply helps users identify portions of the recording where excessive noise or signal loss may limit the effectiveness of downstream cleaning tools.

Why It Matters

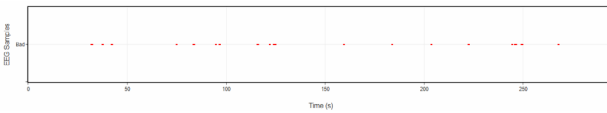
Residual bad data increases variance and may skew averages or topographic results.

How to Use It

Use this plot to evaluate how much of the data is fundamentally unusable.

If >10%, consider re-recording the session.

Confirm whether bad segments are isolated (minor fix) or prolonged (session invalidation).



Bad segments

Session-Wide Signal Consistency

Evaluates how well each channel remained consistent throughout the session using a robust correlation method.

Why It Matters

This is a core measure of electrode reliability over time — particularly relevant for dry EEG, where contact can shift.

How to Use It

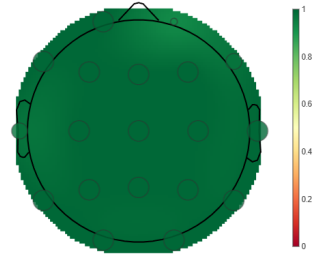
Channels with values <0.6 likely suffered dropouts.

Use this metric to flag inconsistent electrodes for maintenance or exclusion.

High scores across channels = stable headset fit.

How to Improve Score

Try lowering impedance of the channels to get higher score.



Local Signal Reliability

Compares each channel to its neighbors frame-by-frame to assess local coherence.

Why It Matters

Ensures channels are capturing meaningful brain signal and not local artifact or noise.

How to Use It

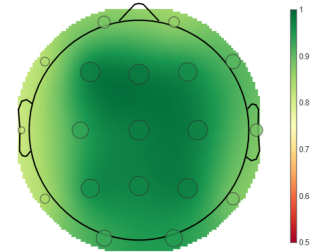
Low local correlation often points to isolated poor contact or regional interference.

Cross-reference with bad channel flags and impedance if available.

Spatially coherent signals give stronger confidence in findings.

How to Improve Score

Try lowering impedance of the channels to get higher score.



High-Frequency Noise

Shows power in the >60 Hz range as a z-score relative to expected EEG power.

Why It Matters

High-frequency noise typically stems from non-neural sources like muscle tension or other electronics.

How to Use It

Values >1.5 suggest signal contamination

Temporal region = jaw clenching

Occipital region = neck tension

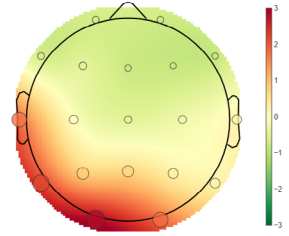
Reduce environmental EM sources if high line noise coincides.

How to Improve Score

Temporal region: Relax jaw muscle by opening the mouth and closing a few times before recording.

Occipital region: Ask the subject to relax shoulder muscles by light stretches and adjusting posture.

Inspect the room for other devices/electronics that might generate high frequency electrical noise.



Line Noise

Shows how much 50/60 Hz interference is present in the signal.

Why It Matters

Powerline noise (50/60 Hz) interferes with EEG signals by masking low-amplitude brain activity and distorting frequency-based analyses, leading to inaccurate interpretations. It also degrades signal quality for machine learning, connectivity measures, and real-time applications, making data less reliable unless properly filtered.

How to Use It

Time plot reveals when line noise peaks (e.g., during recharging or power-up events).

Average line noise >2.5 should prompt environment review.

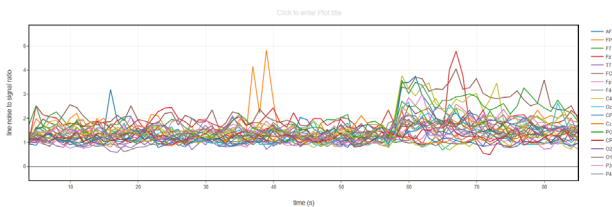
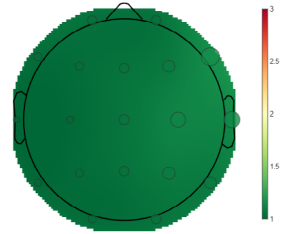
Consider applying a notch filter during preprocessing if needed.

How to Improve Score

Lower each channel's impedance values.

Try recording at a electrically cleaner environment. Subject should be away from power cords. Close lighting (an old standing lamp) can also introduce noise.

Use the Line Noise (over time) plot to determine if trimming is required and rerun the report. If line noise is only significant in the beginning and at the end, trimming can help.



Spectral Analysis

Displays the power spectrum for the trimmed segment of the recording.

Why It Matters

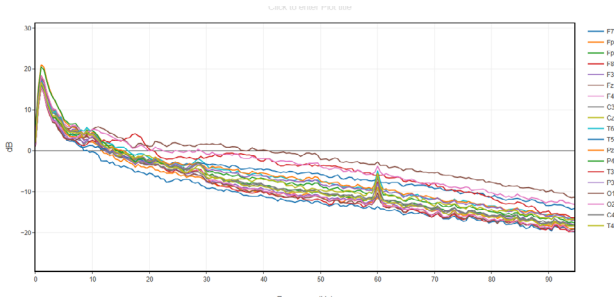
This confirms whether expected EEG rhythms are present and can reveal excess energy in unintended bands.

How to Use It

Look for clear alpha peaks in resting-state eyes-closed sessions.

Examine delta and theta in cognitive workload paradigms.

Spikes in high-frequency bins may suggest line noise.



Raw EEG Plot

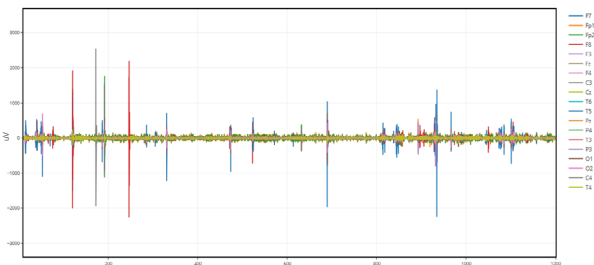
Displays the raw EEG data (after 1 Hz high pass filter).

Why It Matters

Display the raw EEG over time. User can inspect the raw signal to get better insight of the recording.

How to Use It

Inspect the raw EEG signal and look for unusual signals such as extreme large amplitudes spikes. Use this information to determine if trimming is necessary. Often time artifacts associated with donning and doffing can be removed to determine the signal quality of the middle segment of the recording.



Understanding The Reports: Quality Metrics

Quality Metrics Table

These tables provide numerical values for each metric, per channel.

Why It Matters

Allows for precise thresholding, filtering, and documentation. Especially useful for reproducible workflows and QA tracking across studies.

How to Use It

Quantitative way to score quality of a recording.

For best results, always combine summary maps with deeper inspection of artifacts, noise, and signal metrics. When in doubt, trim aggressively and re-run Signal Quality Check to focus on high-quality EEG segments only.

Good/Bad Channels

	average	AP7	FP2	F7	F8	T7	T8	FC5	FP1	F4	C4	Cz	CP5	Cz	CP5	O2	O1	P3	P4	PT	PN	Pz	POT	TR	C3	FC2	F3	FB	FC5	AP8	
G02_sigcheck_APT_FP2_F7_F8.off	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Artifact Ratio

	average	AP7	FP2	F7	F8	T7	T8	FC5	FP1	F4	C4	Cz	CP5	Cz	CP5	O2	O1	P3	P4	PT	PN	Pz	POT	TR	C3	FC2	F3	FB	FC5	AP8
G02_sigcheck_APT_FP2_F7_F8.off	2.38	0.58	1.72	0.89	0.57	0.91	1.43	0.86	1.62	1.35	1.12	1.48	0.84	0.96	1.45	1.16	0.73	0.71	1.17	0.25	1.67	0.61	1.09	1.02	1.13	0.11	0.52	0.84	0.27	0.36

Channel Dropout (Session-Wide Signal Consistency)

	average	AP7	FP2	F7	F8	T7	T8	FC5	FP1	F4	C4	Cz	CP5	Cz	CP5	O2	O1	P3	P4	PT	PN	Pz	POT	TR	C3	FC2	F3	FB	FC5	AP8
G02_sigcheck_APT_FP2_F7_F8.off	0.32	0.94	0.94	0.94	1.00	1.00	0.94	1.00	0.94	0.98	1.00	0.94	0.96	0.98	0.88	0.94	0.94	0.91	0.94	0.94	0.94	0.94	0.94	0.88	0.94	0.88	0.94	0.94	0.94	0.94

Channel Correlation (Local Signal Reliability)

	average	AP7	FP2	F7	F8	T7	T8	FC5	FP1	F4	C4	Cz	CP5	Cz	CP5	O2	O1	P3	P4	PT	PN	Pz	POT	TR	C3	FC2	F3	FB	FC5	AP8
G02_sigcheck_APT_FP2_F7_F8.off	0.80	0.41	0.42	0.54	0.45	0.45	0.58	0.51	0.71	0.55	0.65	0.76	0.87	0.70	0.54	0.57	0.62	0.61	0.59	0.60	0.61	0.61	0.59	0.67	0.63	0.58	0.59	0.56	0.43	

High Frequency Noise

	average	AP7	FP2	F7	F8	T7	T8	FC5	FP1	F4	C4	Cz	CP5	Cz	CP5	O2	O1	P3	P4	PT	PN	Pz	POT	TR	C3	FC2	F3	FB	FC5	AP8
G02_sigcheck_APT_FP2_F7_F8.off	0.19	0.13	0.14	4.39	4.69	0.69	3.80	0.67	1.64	0.91	0.98	0.94	0.99	0.25	2.12	0.20	0.26	0.63	0.48	0.40	0.22	0.67	0.25	2.19	0.14	1.24	0.66	1.49	0.87	1.17

Line Noise

	average	AP7	FP2	F7	F8	T7	T8	FC5	FP1	F4	C4	Cz	CP5	Cz	CP5	O2	O1	P3	P4	PT	PN	Pz	POT	TR	C3	FC2	F3	FB	FC5	AP8
G02_sigcheck_APT_FP2_F7_F8.off	1.43	1.43	1.54	1.42	1.31	1.10	2.25	1.51	1.53	1.66	1.22	1.43	1.30	1.36	1.86	1.13	1.24	1.04	1.14	1.22	1.30	1.13	1.32	1.99	1.22	1.53	1.41	1.62	1.49	1.62

Disclaimer

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Users must exercise their own Independent judgment in using the software and are solely responsible for verifying the accuracy and applicability of all Information provided by the software for their research purposes.

This software is not intended to replace or act as a substitute for professional medical advice, diagnosis, or treatment. Do not use the information contained within the software for diagnosing or treating a health problem or disease, or prescribing any medication.



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