Hyperkit Analysis Solution

User Documentation

**Abstract.** This document explains the mathematical formulas, which are used to calculate the visualizations.

# Parameters

The software allows to adjust parameters, which apply to all files loaded and all visualizations calculated from the measurements.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Steps |  | User-defined in |
| Points |  | User-defined in |

# Files

The software allows to load files from your file system containing voltage and current measurements associated with timestamps.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Measurement length |  | Number of measurements in the file |
| Timestamp measurement | with | Timestamp of the th measurement |
| Voltage measurement | with | Voltage of the th measurement |
| Current measurement | with | Current of the th measurement |

# Properties

The software defines a range of properties per file. One can distinguish between measured, displayed and derived properties.

## Measured Properties

The following properties are extracted from the measurements contained in the files.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Minimum timestamp measured |  |  |
| Maximum timestamp measured |  |  |
| Minimum voltage measured |  |  |
| Maximum voltage measured |  |  |
| Minimum current measured |  |  |
| Maximum current measured |  |  |

## Displayed Properties

The following properties are used to adjust the display settings of the individual parts.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Minimum timestamp displayed |  | User-defined in |
| Maximum timestamp displayed |  | User-defined in |
| Minimum voltage displayed |  | User-defined in |
| Maximum voltage displayed |  | User-defined in |
| Minimum current displayed |  | User-defined in |
| Maximum current displayed |  | User-defined in |

## Derived Properties

The following properties are derived from the measured and user-defined display properties.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Timestamp interval measured |  |  |
| Timestamp interval displayed |  |  |
| Voltage interval measured |  |  |
| Voltage interval displayed |  |  |
| Current interval measured |  |  |
| Current interval displayed |  |  |

# Voltage timeseries

The software displays a voltage timeseries per file, which can be adjusted according to the parameters and the display properties.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Timestamp subset |  |  |
| Voltage subset |  |  |

# Current timeseries

The software displays a current timeseries per file, which can be adjusted according to the parameters and the display properties.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Timestamp subset |  |  |
| Current subset |  |  |

# Voltage probability density function

The software displays a voltage probability density function per file, which can be adjusted according to the parameters and the display properties.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Voltage element | with |  |
| Probability element | with |  |
| Quantity |  |  |

# Current probability density function

The software displays a current probability density function per file, which can be adjusted according to the parameters and the display properties.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Current element | with |  |
| Probability element | with |  |
| Quantity |  |  |

# Point cloud (actual)

The software displays the actual point cloud and regression line per file, which can be adjusted according to the parameters and the display properties.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Current subset |  | Calculate the set such that (i.e. use the first data points only) |
| Voltage subset |  | Calculate the set such that (i.e. use the first data points only) |
| Regression line |  | Given the linear equation system with and find such that is minimized |

# Point Cloud (statistical)

The software displays the statistical point cloud (minimum, maximum, average) and regression line per file, which can be adjusted according to the parameters and the display properties.

|  |  |  |
| --- | --- | --- |
| **Name** | **Symbol** | **Value** |
| Current subset |  |  |
| Voltage subset |  |  |
| Current element | with |  |
| Voltage minimum element | with |  |
| Voltage average element | with |  |
| Voltage maximum element | with |  |
| Regression line |  | Given the linear equation system with and find such that is minimized |