

ETAS EATB V5.6.0



Report Guide

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1 Safety and Privacy Information

1.1 Intended Use

The ETAS Analytics Toolbox (EATB) is a tool developed to improve data analysis of time-based data series in the automotive field. EATB supports engineers in the measurement and validation of ECU software and allows graphical visualization and further calculations of measured signals. On the one hand, the focus is on the provision of a uniform and stable user interface that allows the correct evaluation of the measurement data and results. On the other hand, due to the volume of data in the digital automotive industry, a high processing rate of big amount of data must be guaranteed.

1.2 Target Group

This information addresses qualified personnel working in the fields of automobile control unit development and calibration. Specialized knowledge in the areas of embedded systems and simulation is required.

1.3 Safety Advice

Adhere to the ETAS Safety Advice for EATB V5.6.0, which is available within the EATB Product. ETAS GmbH cannot be made liable for damage that is caused by incorrect use and not adhering to the safety instructions. Take all information on environmental conditions into consideration before setup and operation (see the documentation of your computer, hardware, etc.).

1.4 Classification of Safety Messages

Safety messages warn of dangers that can lead to personal injury or damage to property:



DANGER

DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.



WARNING

WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.



CAUTION

CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates a situation that, if not avoided, could result in damage to property.

1.5 Data Protection

If the product contains functions that process personal data, legal requirements of data protection and data privacy laws shall be complied with by the customer. As the data controller, the customer usually designs subsequent processing. Therefore, he must check if the protective measures are sufficient.

1.6 Data and Information Security

To securely handle data in the context of this product, see the next sections about data and storage locations as well as technical and organizational measures.

1.6.1 Data and Storage Locations

The following sections give information about data and their respective storage locations for various use cases.

1.6.1.1 License Management

When using the ETAS License Manager in combination with user-based licenses that are managed on the FNP license server within the customer's network, the following data are stored for license management purposes:

Data

- Communication data: IP address
- User data: Windows user ID

Storage location

- FNP license server log files on the customer network

When using the ETAS License Manager in combination with host-based licenses that are provided as FNE machine-based licenses, the following data are stored for license management purposes:

Data

- Activation data: Activation ID
 - Used only for license activation, but not continuously during license usage

Storage location

- FNE trusted storage
C:\ProgramData\ETAS\FlexNet\fne\license\ts

1.6.2 Licensing

A valid license is required to use the software. You can obtain a license in one of the following ways:

- from your tool coordinator
- via the self-service portal on the ETAS website at www.etas.com/support/licensing
- via the ETAS License Manager

To activate the license, you must enter the Activation ID that you received from ETAS during the ordering process.

For more information about ETAS license management, see the [ETAS License Management FAQ](#) or the ETAS License Manager help.

To open the ETAS License Manager help

The ETAS License Manager is available on your computer after the installation of any ETAS software.

1. From the Windows Start menu, select **E > ETAS > ETAS License Manager**.
The ETAS License Manager opens.
2. Click in the ETAS License Manager window and press F1.
The ETAS License Manager help opens.

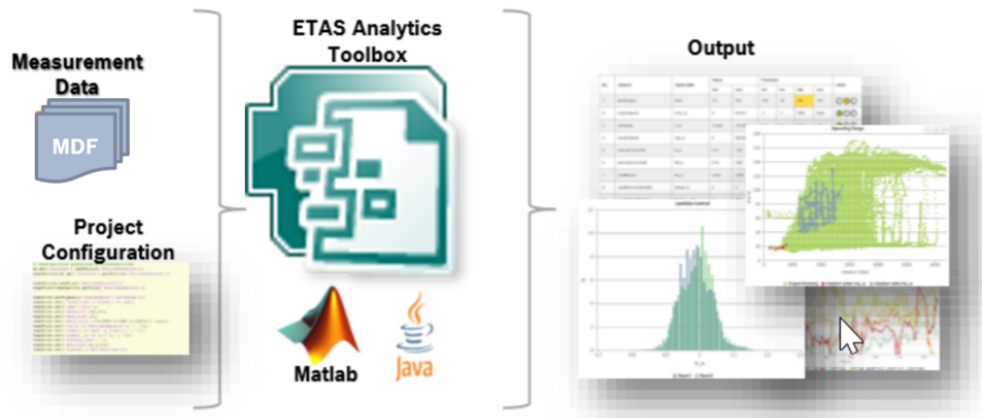
1.6.3 Technical and Organizational Measures

We recommend that your IT department takes appropriate technical and organizational measures, such as classic theft protection and access protection to hardware and software.

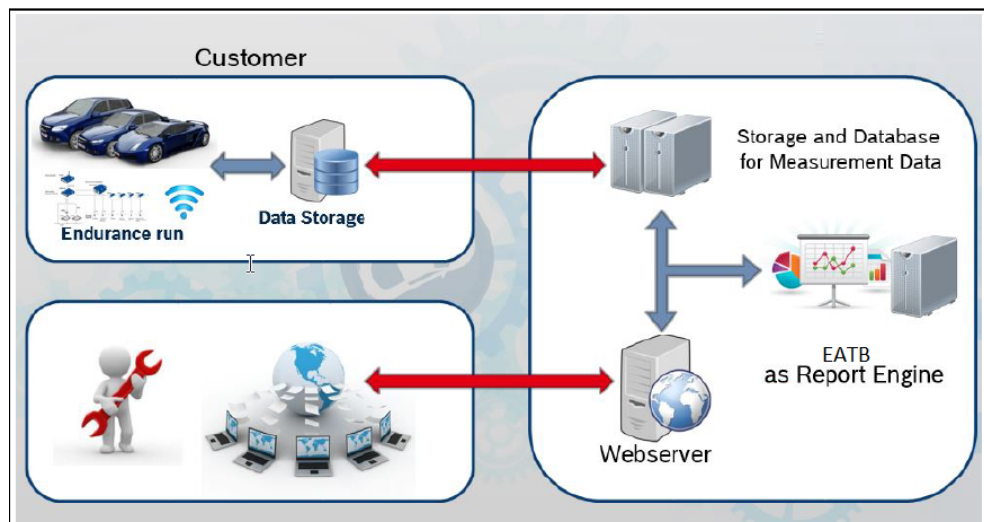
2 Product Overview

The manual evaluation of a number of measurements is very time consuming and prone to error. The ETAS Analytics Toolbox (EATB) can avoid such errors and delivers an evaluation report on all given measurements automatically.

EATB is a MATLAB-based tool that allows you to handle a large amount of data and visualize results in different types of charts and tables in a web application. The interactivity of the generated reports provides many useful options and enables you to easily share reports with other users.



The data recorded and uploaded to some storage location on a server can be transferred to EATB. EATB provides a visualization of the relevant information and critical threshold violations.



2.1 Basics

2.1.1 Report Structure

The report is based on the following hierarchical structure:

- Evaluation
- Chapter
- Section
- Display object (chart or table)
- Child charts

Child charts are displayed in the same chart but contain different data points and can have different settings. The following charts can have child charts: plot, histogram, timeplot, single value bar, and single value line.

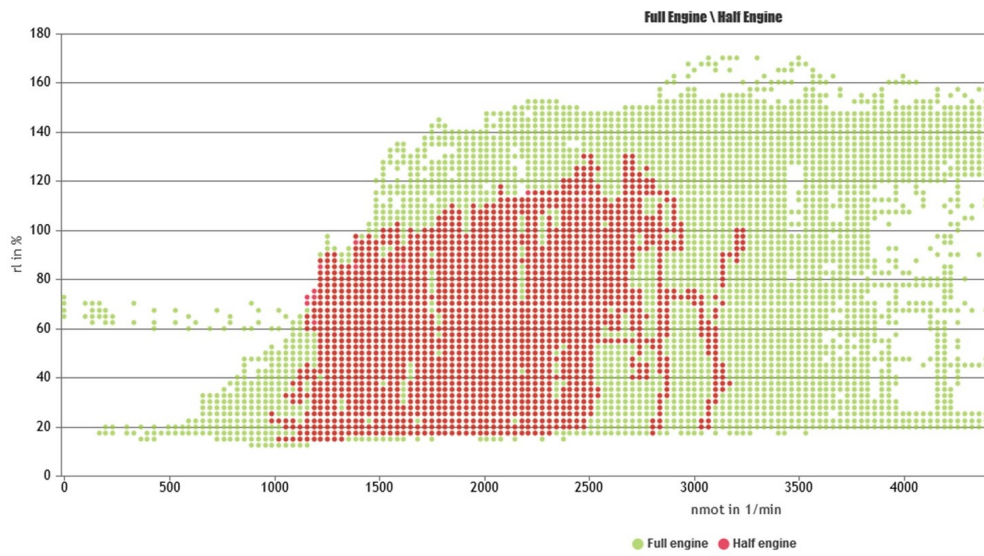
2.1.2 Display Objects

A display object is a subunit of a section containing one or more signals. A display object can either be a chart or table.

2.1.2.1 Chart Types

Plot

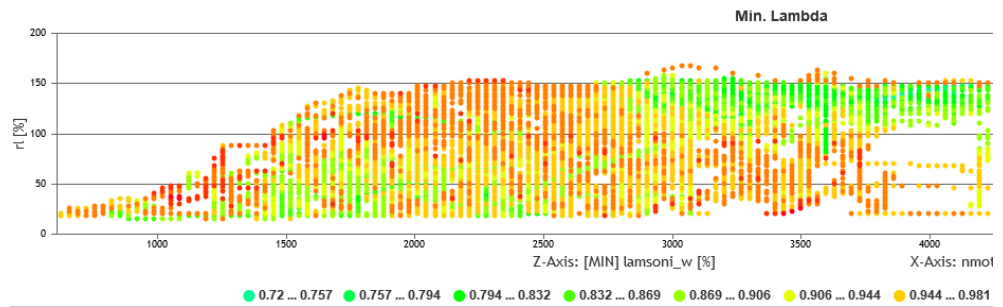
Chart type that represents signals in point clouds, combining two signals and displaying them in dependence. It is also possible to display several signals with different colors in one chart with an associated entry in the legend.



In this example, the engine speed (nmot) is shown on the x axis and the air charge (rl) on the y axis. The plot also has a child shown in red. The red points are the data points when the engine is running in half-engine mode. The green points are the data points when the engine is running in full-engine mode.

Scatter

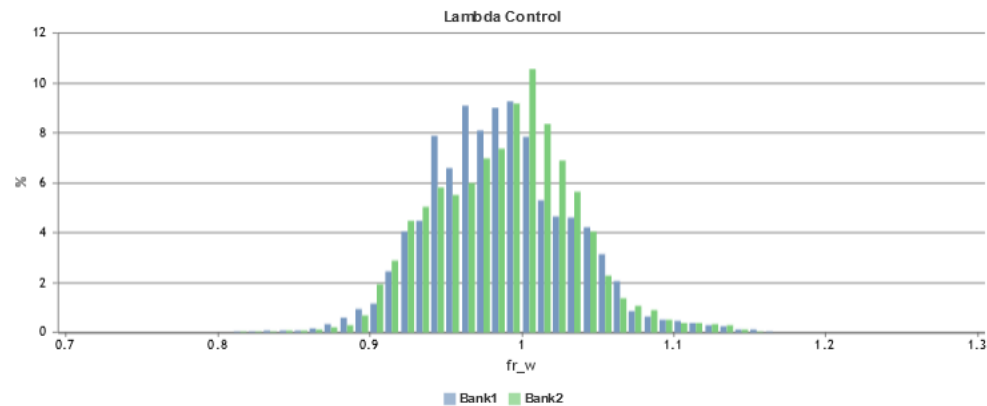
Extension of the chart type plot. In addition to the classical point cloud, a third signal can be used for evaluation. The third signal is integrated into the point cloud by a color map and displayed on the z axis. For a given point according to your x and y value, multiple z values can exist. You can specify which z value should be used in this case. For more information, see ["Display Types" on page 16](#).



Histogram

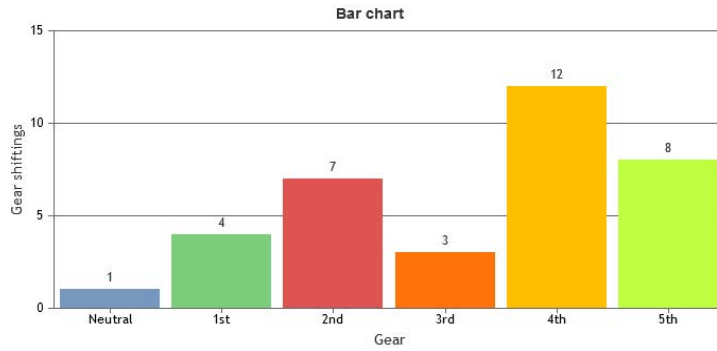
Chart type that represents frequency distributions of certain events or values. Only one signal is allowed as input for the x axis. The y axis can be modified by using display types (`durationAbs`, `durationPercent`, or `steps`). For more information, see ["Display Types" on page 16](#).

A subtype of the histogram is "histpie" that represents the data as proportions of a circle.



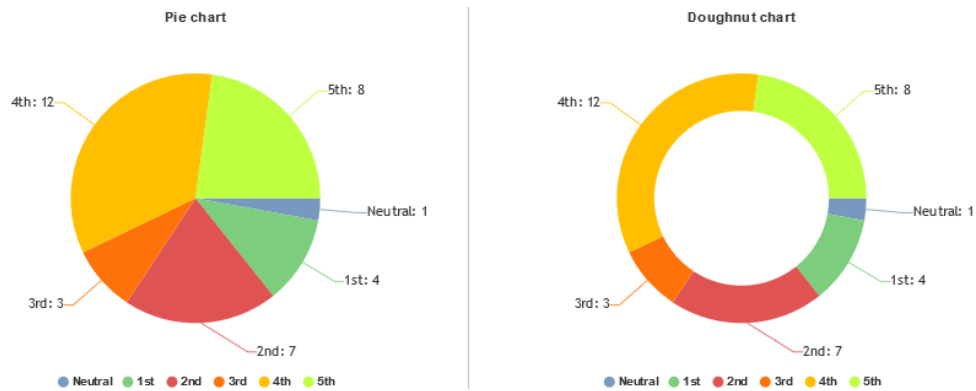
Bar

Extension of histogram. This chart type allows to specify the bins on the x axis and the corresponding values of the y axis.



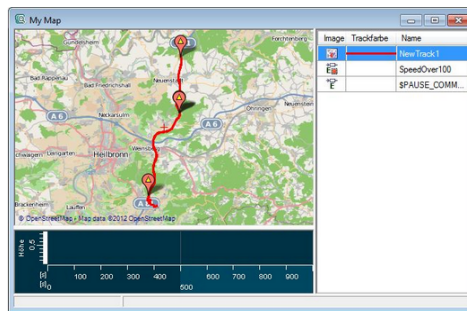
Pie

Extension of "histpie" (subtype of histogram). This chart type allows to define the values for each sector. Optionally, the "doughnut" display type can be used.



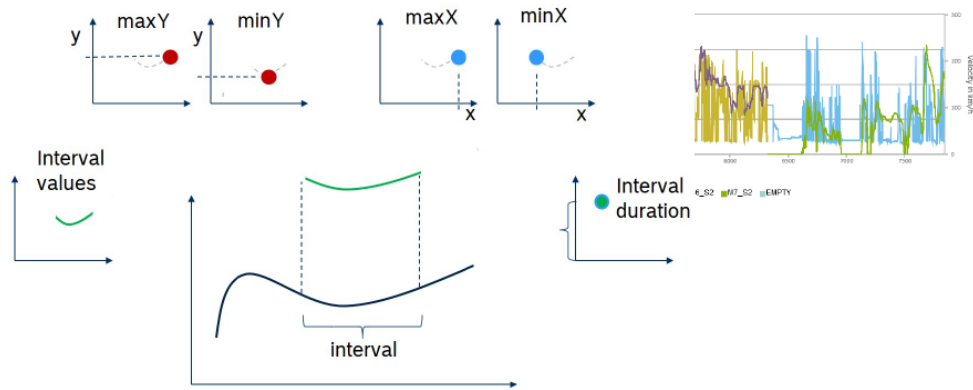
Image

Chart type that allows you to include your own images in the report.



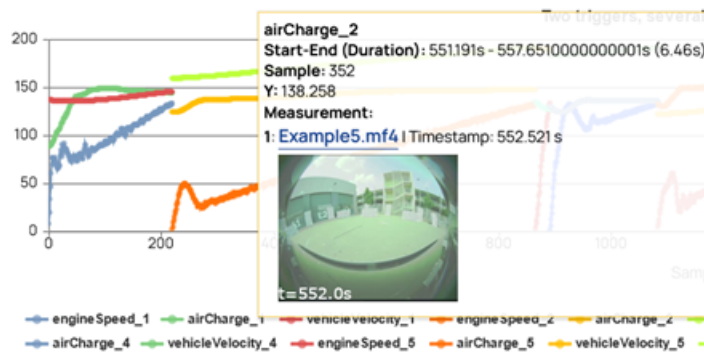
Interval

Chart type that represents a segment of a signal whose boundaries are determined by one trigger with duration or one start and one end trigger. In the following, some examples of intervals with different display types are shown. For more information, see "Display Types" on page 16.



If you have used an environmental camera during measurement recordings, the closest available video information can be shown per timestamp as a screenshot in the tooltip. If multiple videos are available multiple video streams are shown next to each other.

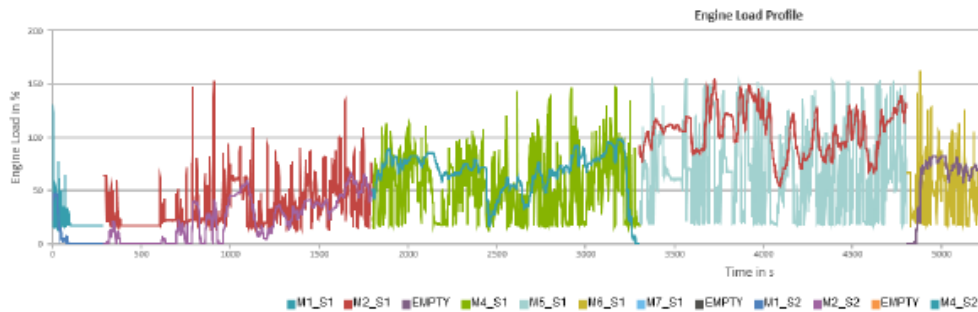
You can enable the video support for timeplots and intervals. Note that you can only enable videos via the EATB Developer Kit.



Timeplot

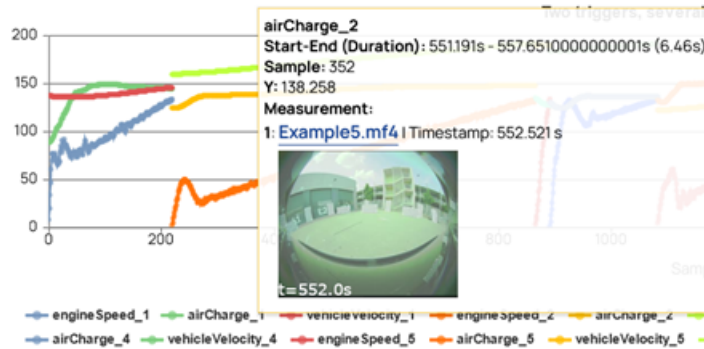
Chart type that has time as x axis. It plots the signal values on the y axis in dependance on the time when the signal values were measured.

If there is more than one signal in a timeplot, you can select from two display types. For more information, see "Display Types" on page 16.



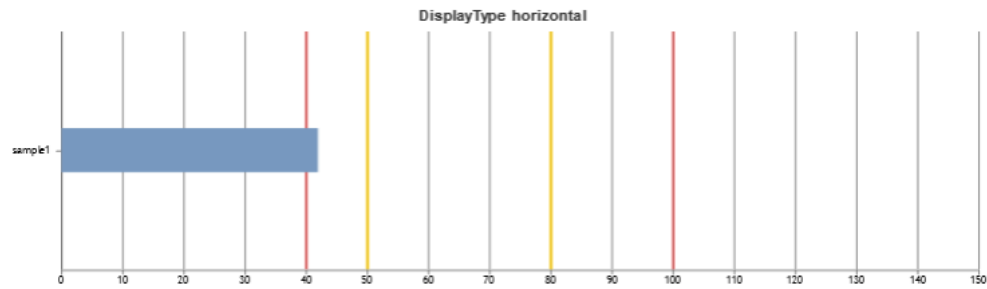
If you have used an environmental camera during measurement recordings, the closest available video information can be shown per timestamp as a screenshot in the tooltip. If multiple videos are available multiple video streams are shown next to each other.

You can enable the video support for timeplots and intervals. Note that you can only enable videos via the EATB Developer Kit.



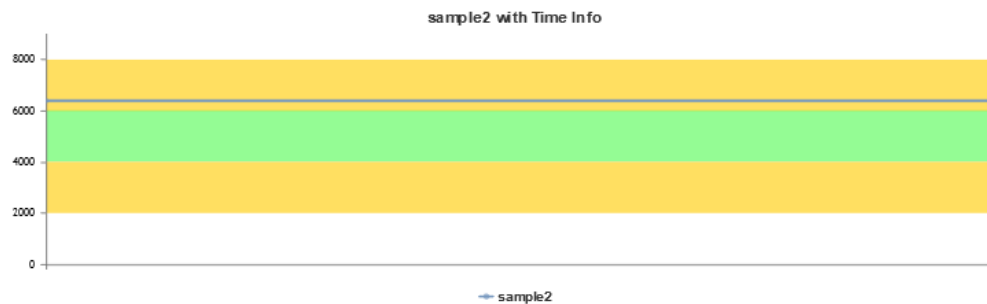
Single Value Bar

Chart type that displays a single value as bar. The bar is just one value, not a class of values. In order to differentiate the thresholds from the bar, the bar is shown rotated to the threshold lines. With the display type, you can select how the bar shall be positioned. For more information, see "Display Types" on page 16.



Single Value Line

Chart type that displays a single value as line. The thresholds are displayed as ranges. For more information about the ranges, see "Traffic Lights" on page 19.



2.1.2.2 Table Types

MinMax Table

Table type that shows the evaluation of the global maximum and the global minimum of each signal. Additionally, each row shows the associated thresholds and

the status of the traffic light. When exceeding a threshold, the affected fields are marked in the appropriate color. If no thresholds are defined for a signal, the traffic light is gray. For more information, see "Traffic Lights" on page 19.

In the signal label column, only the name of Alias1 is displayed and not of all the found aliases. Optionally, conditions and triggers can be defined to select specific intervals of a signal for evaluation. For more information, see "Conditions, Triggers, and Filters" on page 24.

No.	Signal-Id	Signal-Label	Values		Thresholds				Check
			min	max	min	low	high	max	
1	RngMod_trqFitACGeaa	RngMod_trqFitACGeaa	656	1260	22	25	40	2000	
2	engineSpeed	nmot_w	833	1701	100	110	400	1000	
3	zwbas	zwbas	668	931	100	120	1500	20000	
4	Tra_trqDesMin	Tra_trqDesMin	613	1491					

IUMPR Table

Table type that is used for analyzing DFCs. Each row belongs to one signal and contains the numerator, denominator, the resulting ratio, thresholds, traffic light, and a graphic showing ratio and thresholds.

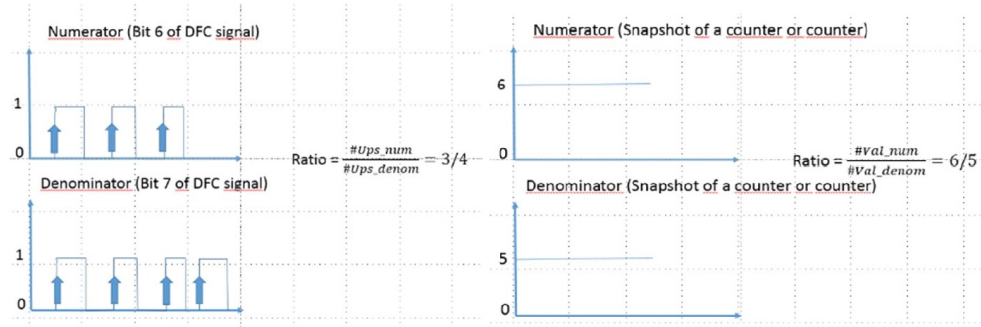
Group	Signal-Id	Num	Denom	Ratio	Thresholds		Check	Ratio and Thresholds
					min	low		
KAT	Ratio_KAT_1	18	18	1	0.336	0.5		
KAT	Ratio_KAT_2	18	18	1	0.336	0.5		
LSU	Ratio_LSU_1	19	18	1.056	0.336	0.5		
LSU	Ratio_LSU_2	18	18	1	0.336	0.5		
CAM	Ratio_CAM	33	18	1.833	0.336	0.5		
SLS	Ratio_SLS	0	0	7.995	0.336	0.5		
EVAP	Ratio_EVAP	0	0	7.995	0.336	0.5		
LSF	Ratio_LSF_1	19	18	1.056	0.336	0.5		
LSF	Ratio_LSF_2	19	18	1.056	0.336	0.5		

Display: cumulative

0 1 2

The numerators and denominators of the ratios can be passed to EATB by two different ways:

- bit: The numerators and denominators of the ratios are stored as bits 6 and 7 of one DFC signal (int8).
- int: The numerators and denominators of the ratios are stored as "counter" signals where the numerator and denominator are counted events and provided in two separate signals.



EATB detects the situation based on the number of signals you provide. Therefore, you cannot mix "bit" and "int".

The following table shows exemplary situations that can appear, where the ratios are set with respect to judicial laws (where defined):

Measurement	M1	M2	M3	M4	M5	M6	M7	M8
Numerator	0	1	0	1	empty	empty	~=0	10
Denominator	0	0	1	1	empty	~=0	empty	1
Ratio (true I set)	NaN 7.9-95	Inf 7.99-5	0 0	1 1	-- --	-- --	-- --	10 7.99-5
Status	--	green	red	green	gray	gray	gray	green

In this table, the status "-" means that no traffic light is shown. For more information, see "Traffic Lights" on page 19. For more information about the available display types for an IUMPR table, see "Display Types" on the next page.

Custom Table

Table type that offers a flexible user-defined layout. It cannot contain signals.

Name	Value
distance	137km
total distance	36459km
driver	John Brown
check	●
Project finished!	




DFC Table

Special table type for detecting and reporting the diagnostic fault checks (DFC). Each row contains the DFC value, the file where the status first changed to this DFC value, the time stamp of that change, and the counter of all status changes

to this DFC value. This table type can only be configured with the EATB Developer Kit.

DFC values			
Value	(First) occurrence in	Timestamp [in s]	(Total) counter
DFC_SCRCtlRmnDstInfo (183)	10-07-... .dat	3168.942	3
DFC_SCRCtlRmnDstWrm1 (184)	10-07-... .dat	3168.952	1
DFC_EGRVivCurrLim (562)	10-07-... .dat	342.338	2

There are three traffic light statuses:

Color	Name	Description
	Gray	Missing signal(s) in measurement
	Green	No DFC status changes were found (empty table) and measurements contain all required signals.
	Red	At least one DFC status change was found (non-empty table).

2.1.3 Display Types

The display type allows to define the representation of a specific display object. For the following display objects, the display types are available:

- "Scatter" below
- "Histogram" below
- "Interval" on page 18
- "Timeplot" on page 18
- "Single Value Bar" on page 19
- "IUMPR Table" on page 19

Scatter

- min: Minimum of the corresponding z values
- mean: Mean value of the corresponding z values
- max (default): Maximum of the corresponding z values
- absFrequency: Absolute frequency of the corresponding z values
- relFrequency: Relative frequency of the corresponding z values
- relMeanFrequency: Mean frequency of the corresponding z values
- durationAbs: Absolute duration of all corresponding z values

Histogram

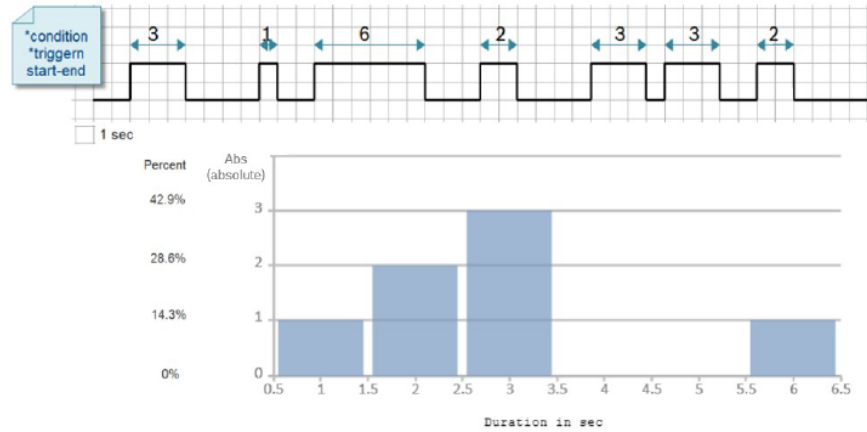
- value (default):
Representation of the frequency distribution of a value in absolute number
- percent:
Representation of the frequency distribution of a value in percent
- durationAbs:

Overview of the duration of a value in absolute number; you must specify at least one condition or two triggers (start+end), otherwise you get the view of value / percent.

– durationPercent:

Overview of the duration of a defined event shown relative to the total measurement time; you must specify at least one condition or two triggers (start+end), otherwise you get the view of value / percent.

Example:



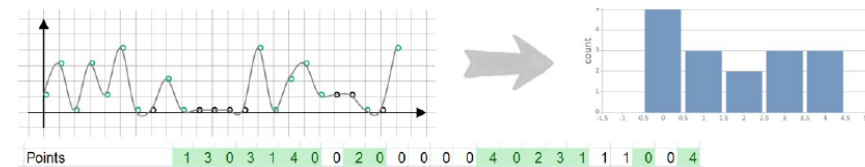
– steps:

Number of existing steps for each signal value; this assignment is independent of the step distance and time according to the measurement grid. An occurred step is always assigned to the target value.

Example 1:

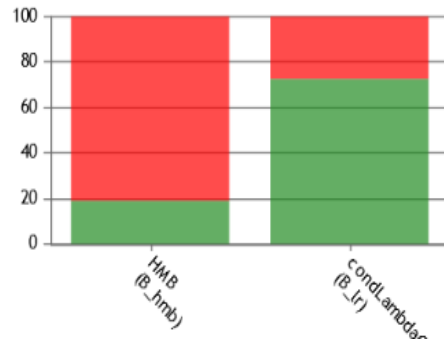


Example 2:



– bar (for bit signals only):

Frequency of states to evaluate multiple bit signals; no quantity and range need to be set.



In the generated report, you can switch the display type again.

Interval

- series:

The x axis shows the index of the samples. The y axis shows the signal values. The start index of the samples for the calculation is the last index from the last measurement + 1.

- stack:

The x axis shows the index of the samples starting with 1. The y axis shows the signal values.

- minX, minY, meanX, meanY, maxX, maxY:

If only one signal is set for the chart, the x axis shows the samples and the y axis shows the signal values. If two signals are set for the chart, the x axis shows the values of the first signal and the y axis shows the values of the second signal.

- duration:

The x axis shows the signal values. The y axis shows the durations of found intervals.

If you use minX, minY, meanX, meanY, maxX, maxY, or duration, you get a chart that is similar to a plot. There are two ways for displaying the data: If you specify two signals, the first one is on the x axis and the second one on the y axis. If you specify one signal, the x axis shows individual samples that belong to the individual intervals, respectively.

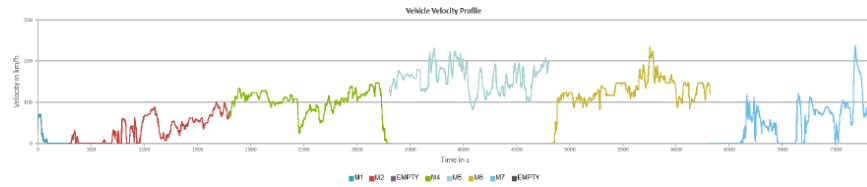
In the generated report, you can switch between "series" and "stack".

Timeplot

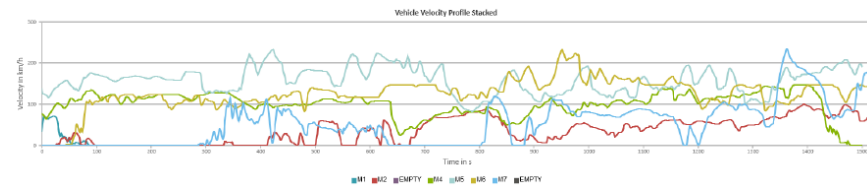
The x axis is the time axis. The y axis shows the signal values. If the display type is "stack", the first sample of every measurements starts with 1.

If there is more than one signal in a timeplot, you can select from two display types:

- time: Different signals displayed in sequence



- stack: Different signals displayed one above the other



Single Value Bar

- vertical: Vertical single value bar with horizontal thresholds
- horizontal: Horizontal single value bar with vertical thresholds

IUMPR Table

- cumulative: One status for all measurements shall be used.
- single: One status per measurement shall be used.

Note that the traffic light on section level is always cumulative. The traffic light colors are set with respect to the following set of rules:

Color	Name	Description
● Gray	Gray	Data is missing.
● Green	Green	All ratios are green, i.e. all ratios are above the "low" threshold. No gray, yellow, or red status is in the table.
● Yellow	Yellow	There is at least one yellow status, i.e. one ratio above the "minimum" and below "low" thresholds. No red status is in the table but gray and green are allowed.
● Red	Red	There is at least one red status, i.e. one ratio below the "minimum" threshold.

In the generated report, you can switch between "cumulative" and "single", i.e. the status of the last measurement.





2.1.4 Thresholds

Thresholds are used to indicate whether evaluated data is located inside or outside some given range or area. Thresholds are visualized with traffic lights.

2.1.4.1 Traffic Lights


Traffic lights on all levels of the report structure indicate if a defined threshold has been violated. Based on the traffic lights of each display object, traffic lights on higher levels are calculated automatically.

The traffic light colors are defined as follows:



Color	Description
	No thresholds were set or signals were empty.
	No threshold is violated.
	No critical threshold is violated.
	A critical threshold is violated.

The ranges for the colors are defined as follows:



 **Note**

Accepted threshold violations are thresholds that have been defined as not critical for the evaluation during report creation. The accepted threshold violations are marked in the report with a green edge:

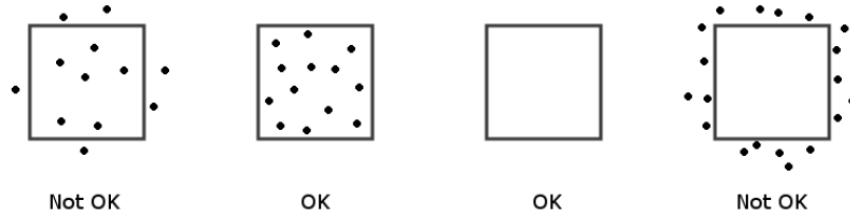
-  Accepted threshold violation in the yellow range
-  Accepted threshold violation in the red range

2.1.4.2 Evaluation Behaviors and Tolerance Types

For each threshold, you can define the evaluation behavior and / or the tolerance type. If you combine both, it has an impact on the evaluation.

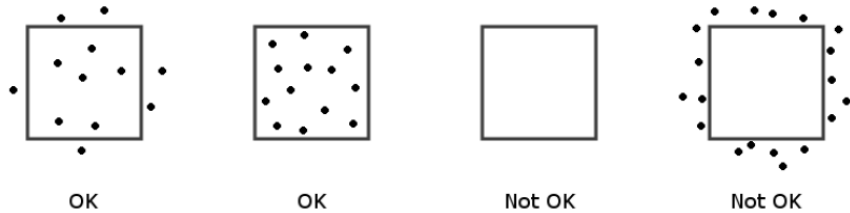
Evaluation Behaviors

- all:
As long as at least one point is outside the feasible range, the threshold is violated.



– any:

As long as at least one point is in the feasible range, the threshold is not violated.



Tolerance Types

You can set the tolerance for the evaluation of traffic lights. In this case, the traffic lights change if the tolerance condition also applies.



Note

The MinMax table does not support any tolerance types.

The following tolerance types are available:

– percent:

Tolerance type that defines the minimum or maximum percentage of the points that must or may lie inside or outside the feasible range without violating the thresholds.

– time:

Tolerance type that defines the maximum time in seconds, for which the time series can leave the feasible range continuously, and the thresholds would still be considered as not violated.

– count:

Tolerance type that defines how many points are allowed to lie inside or outside the feasible range and the thresholds would still be considered as not violated. This evaluation behavior corresponds to percent tolerance but uses the absolute instead of relative point numbers.

Combinations of Evaluation Behaviors and Tolerance Types

The ranges are based on the definition as given in ["Traffic Lights" on page 19](#).

– **"all" without tolerance**

If all points are in the green range, the traffic light is green.

If $>= 1$ points are in the yellow range, the traffic light is yellow.

If ≥ 1 points are in the red range, the traffic light is red.

The red light has the highest priority, then yellow, then green.

– **"all" with percent tolerance, e.g. "10%"**

The maximum percentage of all charts points that could lie outside of the feasible range and the thresholds still would be considered as not violated.



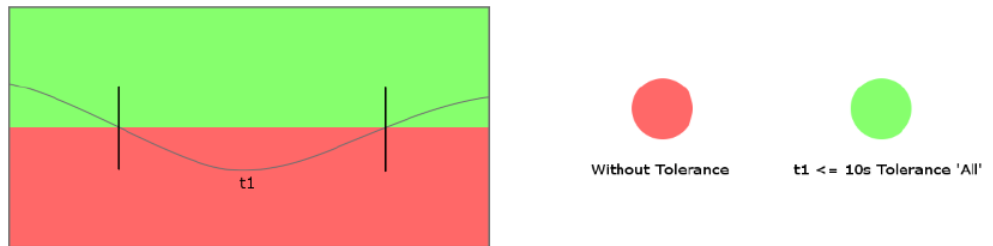
If $\geq 90\%$ points in green range, the traffic light is green.

If $< 90\%$ points in green range, and $\geq 90\%$ points in yellow + green range, the traffic light is yellow.

If $< 90\%$ points in green + yellow ranges, the traffic light is red.

– **"all" with time tolerance, e.g. "10s"**

The maximum time in seconds that the time series can leave the feasible area continuously and the thresholds would still be considered as not violated.



If the signal time series enters the yellow range $> 10s$ continuously, the traffic light is yellow.

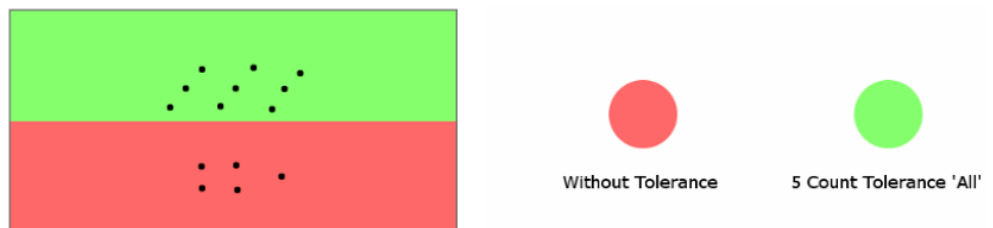
If the signal time series enters the red range $> 10s$ continuously, the traffic light is red.

Otherwise the traffic light is green.

Red light has the highest priority, then yellow, then green.

– **"all" with count tolerance, e.g. "5"**

The maximum signal points are allowed to lie outside of the feasible range and the thresholds would still be considered as not violated.



If ≤ 5 points in yellow + red ranges, the traffic light is green.

If > 5 points in yellow + red ranges and ≤ 5 points in red range, the traffic light is yellow.

If > 5 points in red range, the traffic light is red.

– **"any" without tolerance**

If all points are in red range, the traffic light is red.

If ≥ 1 point in yellow range, the traffic light is yellow.

If ≥ 1 point in green range, the traffic light is green.

Green light has the highest priority, then yellow, then red.

– **"any" with percent tolerance, e.g. "10%"**

The minimum percentage of the points which must lie inside of the feasible range so that the thresholds would be considered as not violated.



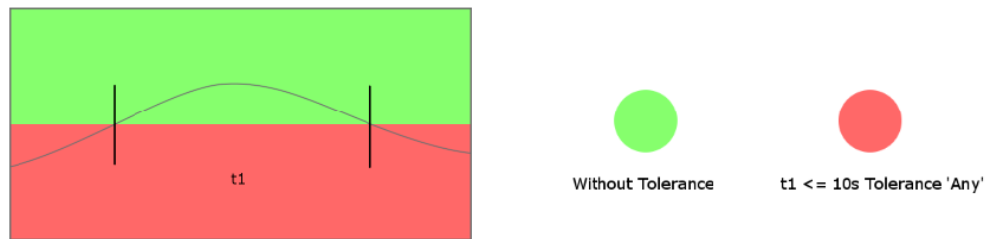
If $\geq 90\%$ points in red range, the traffic light is red.

If $< 90\%$ points in red range and $\geq 90\%$ points in yellow + red range, the traffic light is yellow.

If $< 90\%$ points in yellow + red ranges, the traffic light is green.

– **"any" with time tolerance, e.g. "10s"**

The minimum time in seconds that the time series must enter the feasible range continuously and the thresholds would be considered as not violated.



If the signal time series enters the yellow range $> 10s$ continuously, the traffic light is yellow.

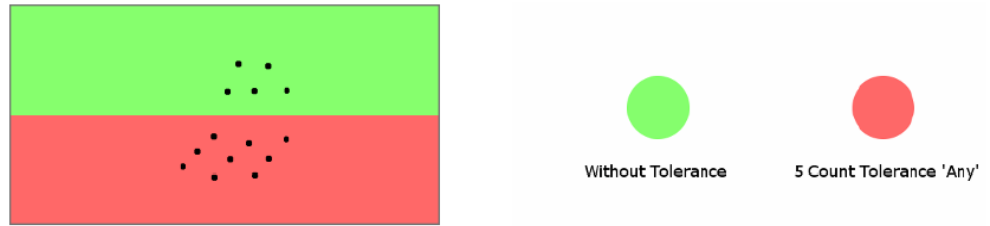
If the signal time series enters the green range $> 10s$ continuously, the traffic light is green.

Otherwise, the traffic light is red.

Green light has the highest priority, then yellow, then red.

– **"any" with count tolerance, e.g. "5"**

The minimum signal points are needed to lie inside of the feasible range so that the thresholds would be considered as not violated.



If ≤ 5 points in yellow + green ranges, the traffic light is red.

If > 5 points in yellow + green ranges and ≤ 5 points in green range, the traffic light is yellow.

If > 5 points in green range, the traffic light is green.

2.1.5 Conditions, Triggers, and Filters

Conditions

Calculation of a binary mask that, when attached to the signals in a display object, returns only the signal segments fulfilling the given condition.

Triggers

Calculation of a binary mask that, when attached to the signals in a display object, returns only the first points of the signal segments fulfilling the given trigger condition but only if the trigger condition was not fulfilled at the points before the triggered ones.

Filters

– **Conditional Filter:**

Filter type that calculates a binary mask which is used to hide insignificant points. Conditional filters can be applied to measured and calculated signals and the filter results can be plotted.

- Step Detector: Basic step detection
- Step Detector Canny: Step detection according to the Canny method
- Steady MinMax: Basic detection of stationary states with a moving window min / max filter
- Steady SAM: Detection of stationary states

– **Inline Filter:**

Filter type that is based on the time (as used in signal processing). Inline filters are always applied to the plotted signals.

- BP1: Band pass filter 1st order
- HP1: High pass filter 1st order
- PT1: Low pass filter 1st order

Applicability of Conditions, Triggers, and Filters

Only for the display objects listed in the table below, filters, triggers, or conditions are available. All other display objects do not support this option.

Display Object	Condition	Trigger	Filter
Plot	YES	YES	YES
Scatter	YES	YES	YES
Histogram	YES	YES	YES
Interval	YES	Only for the definition of the interval (start and end trigger or one duration trigger)	Inline filter only
Timeplot	YES (timestamps not always supported)	NO	Inline filter only (timestamps not always supported)
MinMax	YES (timestamps not always supported)	YES (timestamps not always supported)	YES (timestamps not always supported)

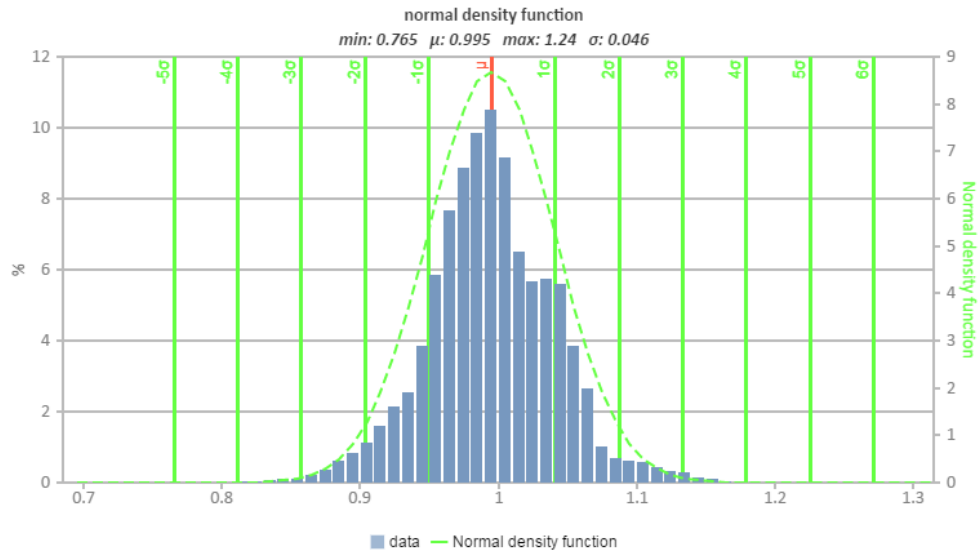


Note

If both, conditions and triggers are defined, EATB applies the conditions first. Then, the triggers act on the signal data selected by the conditions.

2.1.6 Chart Functions

In plots and histograms, you can use chart functions for statistical analysis. The following example shows the normal density function:



Note that the functions always depend on one specific data series (of the parent or xth child chart).

The following chart functions are available:

Name	Chart Type	Description	Key
Lower boundary	plot	Adds a lower boundary that connects the smallest neighbor y values for each x value.	'lb', 'lower boundary'
Upper boundary	plot	Adds upper boundary that connects the biggest neighbor y values for each x value.	'ub', 'upper boundary'
Avg	plot	Adds an average line between the min and max values as $y = ((max_y - min_y) / 2) + min_y$.	'avg'

Weighted avg	plot	Adds a weighted average line between the min and max value according to the number of points as $\sum \text{points}(i) * \text{weight}(i)$, where $\text{weight}(i) = 1 / \text{number of points}$.	'avgw', 'weighted avg'
+ / - sigma	plot	Adds the sigma values as standard deviations.	'sigma'
normal density function	histogram	Adds the normal density function and sigma-grid.	'ndf', 'normal density function'
Minimum / Average / Maximum	histogram	Shows minimum, maximum, and average of one set of data displayed in the chart.	'minmeanmax', 'min, mean, max'
distribution function	histogram	Adds the cumulative distribution function (range 0...1).	'distribution', 'distribution function'
Sigma values	histogram	Adds the sigma values as standard deviations.	-
Quartile	histogram	Adds the 25%, median, and 75% quartiles.	'quartile'

In the generated report, you can add these functions to the chart.

2.1.7 Merge Modes

Several evaluations can be merged during the creation of the report. How the evaluations shall be merged can be defined by different merge modes. In the report, you can change this merge mode again.

The following merge modes exist:

- **Split (group same points)**

Appends the data series. All common points are marked with a different color as a group. You can change the default name of the group ("same").

- **Split**

Appends the data series. Each report is marked in a different color to distinguish it from the other reports.

- **Combined**

Merges all points of data series into one. The parent chart is merged with the parent chart, the first child chart is merged with the first child chart and so forth. In the report, you can distinguish the points via the legend (e.g. "Epm_nEng@Report1" and "Epm_nEng@Report2").

Not all display objects support all merge modes. The following table shows the supported merge modes:

Display Object	Split (group same points)	Split	Combined
Plot	YES	YES	YES
Scatter	-	-	YES
Histogram	-	YES	YES
Interval	-	YES	-
Timeplot	-	YES	-
Single Value Bar	-	YES	-
Single Value Line	-	YES	-
MinMax Table	-	YES	YES
IUMPR Table	-	YES	YES
Custom Table	-	YES	-
DFC Table	-	YES	-



Note

Histpie, bar, pie, image, and interval in box-whisker view do not support any merge mode. In a merged report, these charts are shown empty.

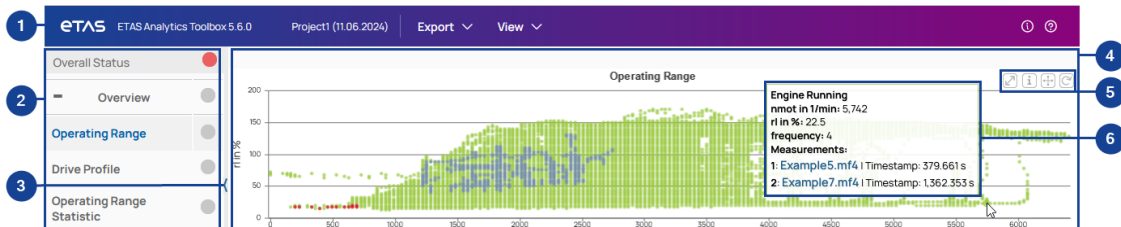
2.1.8 Calculation Details





All duplicated points in the charts are removed during the calculation to reduce the amount of data. In the report, the tooltip shows the information of the first occurrence of a point.

If several measurement files are used, the point is the first occurrence of all measurement files. Only in case of histograms, you get the first occurrence per measurement file.

3 EATB Report

The EATB Report shows the result of an evaluation. One peculiarity of the report is the interactivity. Using this interactivity, you can display background information about each display object or hide several data series. Additionally, the traffic light system used to signalize the violation of predefined thresholds helps you to perform a quick validation of the generated display objects.




No.	Description
1	Toolbar: Get general information about the complete report, export the complete report, or adjust the settings for all display objects in the report.
2	Tree view: Expand or collapse the structure elements of the report. For more information, see "Report Structure" on page 8 .
3	Sidebar arrow: Close or open the sidebar view.
4	Main window: Get detailed information about each display object.
5	Options for display object: <ul style="list-style-type: none">  Open the display object in full screen mode. By using the arrow icon in the right bottom corner of the full screen mode, you can navigate to the next display object.  Show information about the selected display object.  Visible only if you have zoomed into the chart before. You can switch between zoom and scroll mode. You always see the button for the mode you are currently not using. For more information, see "Zooming and Scrolling" on page 33.  Visible only if you have zoomed into the chart before. You can reset the chart to the initial view.
6	Tooltip: Get sample-specific information by hovering the mouse over a chart. For more information, see "Using the Tooltip" on page 35 .

3.1 Getting Information about the Report


There are several options how you can get information about the complete report or parts of it:

- "To get general report and measurement information" below
- "To get signal information of all signals in the report" below
- "To get signal information of signals used in a display object" below
- "To get display object information" on the next page
- "To get threshold information" on the next page


To get general report and measurement information

1. In the toolbar of the report, click .
2. Do one of the following:
 - To display the general report information, select the **Report Info** tab. Optionally, you can change the MDA path here. If you use the MDA export functionality, this path is used by MDA to open the exported MDA configuration. For more information, see ["Exporting an MDA Configuration" on page 39](#).
 - To display the measurement information, select the **Measurement Info** tab.

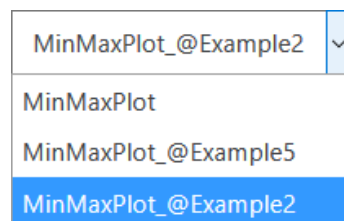
To get signal information of all signals in the report

1. In the toolbar of the report, click .
2. Select the **Signal Info** tab. You can search for specific signals and export them. For more information, see ["Exporting Signal Information" on page 38](#).

To get signal information of signals used in a display object


1. In the upper right corner of the display object, click .
2. Select the **Signal Information** tab.

If the report has been created based on a merge process from several evaluations, you can select the display object for which the signal information shall be displayed. Click the drop-down menu in the upper right corner showing the selectable items, for example:




For more information about the merge modes, see ["Changing the Merge Mode" on page 36](#).

To get display object information

1. In the upper right corner of the display object, click .
2. Select the **Chart Properties** tab.









If the report has been created based on a merge process from several evaluations, you can select the display object for which the signal information shall be displayed. For more information, see step 2 in "[To get signal information of signals used in a display object](#)" on the previous page.

To get threshold information

1. In the toolbar of the report, click .
2. Select the **Threshold Violations** tab.
All detected threshold violations are shown.
3. At the top, the number of thresholds within a certain range (red, yellow, green) is displayed. You can select the thresholds of a specific range by clicking the checkbox below each range. For more information about the ranges, see "[Traffic Lights](#)" on page 19.
4. The tree view, shows the threshold information for each signal. Optionally, you can enter a comment for each signal in the **Activity** field. For example, if a traffic light is red you can describe the activities that should be undertaken to solve the problem.

Note that you can only edit this field if you have opened the report via the EATB software. If you have opened the report by opening the *.html file of the report in your browser, this option is not available.

5. If you expand the tree view, you get the detailed threshold information of this signal including the definition of the ranges and the threshold type. For more information, see Threshold Types.
6. If you further expand the tree view, the location of the threshold (chapter, section, display object) is shown.
7. If you click the **Open** button in this row, the dialog is closed and the display object is shown in the report.

Report Info	Measurement Info	Signal Info	Threshold Violations		
 count: 9 <input checked="" type="checkbox"/>	 count: 1 <input type="checkbox"/>	 count: 7 <input type="checkbox"/>	 count: 0 <input type="checkbox"/>	 count: 18 <input type="checkbox"/>	
Signal	Label	State	Caused by	Activity	
▼ errorCntInjFaultReacMonit	MoF_ctiCOLnj			<input type="text"/>	
State	Type	min	low	high	max
▼ 	constant, 0 percent, all	0	0	1	2
Chapter	Section	DisplayObject			
Calibration	Monitoring Counter	errorCntInjAngleMonitoring			

3.2 Configuring Charts

For charts, you have a various options to configure the visualization and to optimize the view according to your needs. For more information about the chart types and their display types, see ["Chart Types" on page 9](#) and ["Display Types" on page 16](#).

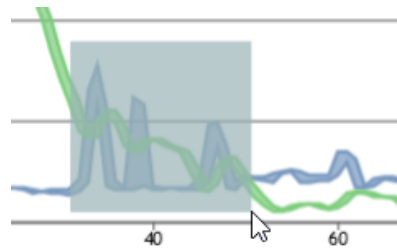
3.2.1 Zooming and Scrolling


You can define a zoom area and synchronize the zooming with other charts. Zooming is possible for the following chart types: plot, scatter, histogram, interval, and timeplot.

To zoom

1. Click into the chart that you want to zoom and keep the left mouse button pressed.
2. Move the mouse cursor.

A gray rectangle indicates the zoom area.




3. Release the mouse button.
The defined area is shown in the chart.
4. To show the complete chart again, click .

To synchronize zooming

1. To zoom into several charts simultaneously, you can synchronize the zooming. Right-click a chart and select **Zoom-Synchronisation** from the context menu.
2. In the **Configure synchronised charts** window, search for the chart that you want to synchronize.
As soon as you enter your search string a list with possible matches is shown.
3. Select the chart from the list.
4. If you want to add more charts, repeat step 3.
5. Click **Save**.
6. Perform the zooming as described in ["To zoom" above](#).
7. To stop the synchronization, open the **Configure synchronised charts** window again as described in step 1 and remove the synchronized charts from the list.

To scroll in the zoomed view

1. To scroll along the axes in zoomed view, you must switch to the scroll mode. In the upper right corner of the chart, click .

The symbol of the mouse pointer changes.

2. Click into the chart and keep the left mouse button pressed while moving the mouse along the axes.

The chart is scrolled according to your mouse movement.

3. To switch back to the zoom mode, click .

3.2.2 Adjusting Axes and the Signal Color

You can define the range and interval of each axis and the color of signals in a chart.

To adjust axes and the signal color

1. Right-click the chart and select **View Properties** from the context menu. The **Operating Range** window is displayed.
2. You can define the following settings:
 - For each axis, you can enter a value for the minimum and maximum range and the interval.
 - For each signal, you can click the color to the right of the signal and select another color.
3. Close the window. The chart is displayed with the defined settings.
4. To show the complete range again, right-click the chart and select **Auto scale** from the context menu.

To define a time offset in a timeplot

1. Right-click the timeplot and select **Time offset** from the context menu.
2. For each signal in the timeplot, you can enter a value for the time offset.
3. Close the window. The timeplot is displayed with the defined time offsets.
4. To show the complete time range again, right-click the timeplot and select **Auto scale** from the context menu.

3.2.3 Using the Legend

By default, a legend is displayed below the chart showing the color definition of the represented samples.

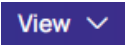
To hide and show samples in the chart via the legend

1. To hide the samples, click the corresponding name in the legend. The samples are no longer displayed in chart. The name in the legend is displayed in light gray.

● 1 ... 616.09 ● 616.09 ... 1231.18 ● 1231.18 ... 1846.27

2. To show the samples again, click the corresponding name in the legend again.

To hide and show the legend

1. To hide the legend, right-click the chart and select **Toggle Legend** from the context menu.
2. To show the legend again, perform the same actions again as in step 1.
Alternatively, you can hide or show the legend of all charts in the report via the toolbar: Click  and select an entry from **Legends**.


3.2.4 Using the Tooltip

By default, a tooltip is displayed in the chart.

To show the sample-specific information

1. Hover the mouse over the chart.
The tooltip shows signal values, the frequency (i.e. the number of overlapping samples), and measurement information of the specific sample.
2. If you move the mouse, the tooltip is updated automatically.
You can also use the tooltip information for MDA export. For more information, see "[Exporting an MDA Configuration](#)" on page 39.

To hide and show the tooltip

1. To hide the tooltip, right-click the chart and select **Toggle Tooltip** from the context menu.
2. To show the tooltip again, perform the same actions again as in step 1.
Alternatively, you can hide or show the tooltip of all charts in the report via the toolbar: Click  and select an entry from **Tooltips**.

3.2.5 Changing the Display Type

Depending on the chart type, you can change the display type. For more information, see "[Display Types](#)" on page 16.

To change the display type

1. Right-click the chart and select **Change [CHART TYPE]** from the context menu. The name of the entry contains the respective chart type.
2. Select one of the available display types for this chart.
The display type is changed and updated in the axis information.

3.2.6 Using Chart Functions

In plots and histograms, you can use chart functions for statistical analysis.

To use a chart function

1. Right-click the chart and select **Calculate** from the context menu.
Depending on the chart type, the available chart functions are displayed.
For more information about the available chart functions, see "[Chart Functions](#)" on page 25.
2. Select one of the chart functions.
3. If several data series are available, you are asked to select one of them.
The chart function is displayed in the chart and added as axis information.

3.2.7 Changing the Merge Mode

The report that you are working with can be based on several evaluations. In this case, a merge process during creation of the report has taken place and a merge mode was selected. In the report, you can change the merge mode again depending on the specific chart type. For more information, see "[Merge Modes](#)" on page 27.


To change the merge mode

1. In a merged report, right-click the chart and select **Change Merge** from the context menu.
The merge modes that are currently not selected are displayed.
2. Select one of the available merge modes.
The merge mode is changed.

3.3 Configuring Tables

For tables, you have some options to configure the visualization. For more information about the table types and their display types, see "[Table Types](#)" on page 13 and "[Display Types](#)" on page 16.

Depending on the table type, you can do the following:

- For all tables except for the custom table, you can display the specific content of a row by clicking on this row. The content is shown in a separate window.
- For IUMPR tables, you can change the display type. Switch from "cumulative" status to a special "single" status, i.e. the status of the last measurement, by clicking . If you have selected "cumulative", you can get the numerators, denominator, ratios, and the status for each measurement by clicking into a table row.
- For MinMax tables, you can see in which measurements the "min" value and the "max" value occur by clicking into a table row. Additionally, you can change the merge mode. The same procedure applies as for charts. For more information, see "[Changing the Merge Mode](#)" above.


3.4 Exporting

You can export the complete EATB Report or parts of it in different data formats.

3.4.1 Exporting the Report

You can export the complete report as *.pdf or *.zip.

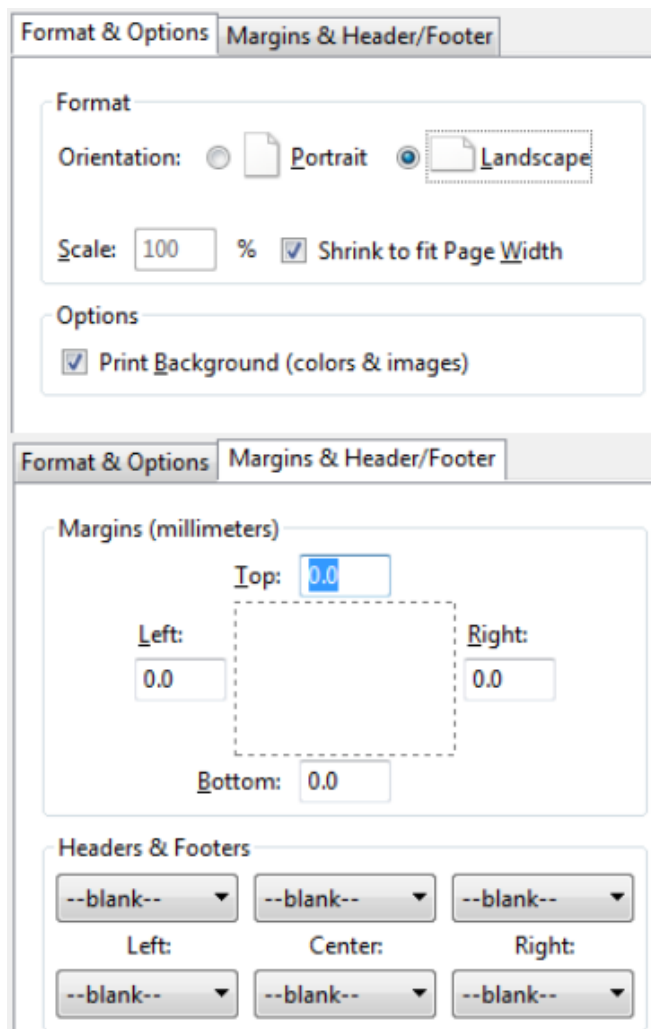
To export the report

1. In the toolbar of the report, click **Export** .

2. Select the data format:

- PDF

You need to have a PDF printer installed. Change the printer settings of your browser as follows:



The image shows two screenshots of a browser's print settings dialog. The top screenshot is the 'Format & Options' tab, where 'Landscape' is selected for orientation, the scale is 100%, and 'Shrink to fit Page Width' is checked. The 'Print Background (colors & images)' option is also checked. The bottom screenshot is the 'Margins & Header/Footer' tab, showing all margins (Top, Left, Right, Bottom) set to 0.0 millimeters. Below the margins, there are three dropdown menus for 'Left', 'Center', and 'Right' headers and footers, all currently set to '--blank--'.

- Zip

The *.html file of the report is zipped together with all *.json files.

- Zip all

Additionally to the *.html file and all *.json files, all measurement files are zipped.

- PPT

You can select the chapters and sections that shall be exported as slides.


The standard dialog for opening files in your browser appears.


3. Open or save the file.

3.4.2 Exporting Signal Information

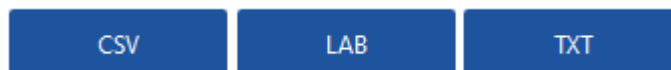
You can export and save the signal information of all signals or of previously selected signals. The following data formats are currently available: *.csv, *.lab, or *.txt.

To export signal information

1. In the toolbar of the report, click .
2. Select the **Signal Info** tab.
3. To select the signals that shall be exported, do one of the following:
 - To find a signal in the complete table, type text into the search box above the table.
 - To find a signal in a specific column (for example in the column of the measurement file "M1"), click the column header and enter your text into the column header.

If you want to clear the search in the columns, click .

4. Select the data format by clicking on one of the buttons next to the search box:



5. Specify the name of the file.
The standard dialog for opening files in your browser appears.
6. Open or save the file.

3.4.3 Exporting a Display Object

You can export and save a specific display object. The following data formats are currently available: *.jpg, *.png, or *.csv. When you select *.csv, it is possible to perform a post-processing of the data in Excel.

To export a display object

1. Right-click the display object.
2. In the context menu, click **Save** and select the data format.
3. If you select **as csv**, you must select the data series that shall be exported in the following cases:

- The report was merged from several evaluations.
The data series that can be selected depend on the merge mode. For more information, see ["Changing the Merge Mode" on page 36](#).
- The chart contains child charts.
For more information about child charts, see ["Report Structure" on page 8](#).

If the exported chart contains child charts or a display type, the name of the exported *.csv file is automatically enhanced by this information. The exported data in the *.csv file depends on the respective display object and display type.

4. The standard dialog for opening files in your browser appears. Open or save the file.

3.4.4 Exporting an MDA Configuration

If you want to analyze signals shown in a display object in further detail, you can export the data as MDA configuration and continue your work with MDA (Measure Data Analyzer) from ETAS.

If you have opened the report via the EATB software, you can choose if you want to create a new *.xda configuration or use an existing *.xda configuration. To use an existing *.xda or *.xdx configuration, you must start the export via the tooltip of the chart. Note that MDA V8.4.1 or a newer version of MDA V8 must be installed on your computer to use this option.



To start the export via the tooltip of chart

Note that this option applies only to charts and not to tables. The tooltip must be visible. For more information, see ["Using the Tooltip" on page 35](#).

1. In the tooltip, click the file name that is displayed as a link at the bottom next to the timestamp information.
2. If you have opened the report by opening the *.html file of the report in your browser, the standard dialog for opening files in your browser appears. Open or save the *.xda configuration. In this case, you cannot select an *.xdx configuration.
3. If you have opened the report via the EATB software, you can do the following:
 - To create a new *.xda configuration, click **Use default XDA**.
The standard dialog for opening files in your browser appears. Open or save the file.
 - To use an existing *.xda or *.xdx configuration, click **Use my own MDA configuration**. Navigate to the file location and select the configuration with **Pick**.

MDA V8 is started to open and replace the measurements in the *.xda or *.xdx files. Single measurements are replaced automatically. Multiple measurements must be selected manually via the "Add or Replace Files" dialog in MDA V8. For more information, press F1 in MDA V8 to open the online help.

To start the export via the MDA Exporter tab

1. Hover the mouse over the display object that you want to export.
2. In the upper right corner of the display object, click .
3. Select the **MDA Exporter** tab.
The global attributes and signal information are shown in a table.
4. On the left of the table, click .
5. Open or save the file.
The standard dialog for opening files in your browser appears.

4 Contact Information

Technical Support

For details of your local sales office as well as your local technical support team and product hotlines, take a look at the ETAS website:

www.etas.com/hotlines

ETAS offers trainings for its products:

www.etas.com/academy



ETAS Headquarters

ETAS GmbH

Borsigstraße 24	Phone:	+49 711 3423-0
70469 Stuttgart	Fax:	+49 711 3423-2106
Germany	Internet:	www.etas.com

5 Glossary

A

accepted threshold violation

User-defined threshold type that marks previously set thresholds as not critical for the evaluation.

C

calculated signal

Signal calculated using MATLAB syntax and defined in a config_diff.m file.

chapter

Largest subunit of a report containing one or more sections.

chart

Display object that shows the signals in graphical representation.

child chart

Chart that is displayed in the same chart as the parent but contains different data points and can have different settings.

condition

Calculation of a binary mask that, when attached to the signals in a display object, returns only the signal segments fulfilling the given condition.

conditional filter

As opposed to inline filter: Filter type that calculates a binary mask which is used to hide insignificant points. Conditional filters can be applied to measured and calculated signals and the filter results can be plotted.

config_diff.m

File used to create calculated signals.

config_filters.m

File used to define filters, e.g. for steady state or step recognition.

config_last.m

File that has the same functionality as config_diff.m with the only difference that it is processed as the last file. This can be used if a post-processing based on the output of the charts is required.

config_signals.csv

File used to define measured signals used for the evaluation.

config_system.m

File used to store system variables and constants.

configuration

Item that encapsulates the necessary information for creating a report including at least one config_signals file, one chapter with one section and one chart or table.

Configuration Creator

Part of EATB Web that allows a quick and easy configuration of charts and reports.

constant threshold

As opposed to function threshold: Threshold type that takes four constants (min, low, high, max) as thresholds. The calculation of the constant threshold is based on the corresponding signal only.

count tolerance

Tolerance type that defines how many points are allowed to lie inside or outside the feasible range and the thresholds would still be considered as not violated. This evaluation behavior corresponds to percent tolerance but uses the absolute instead of relative point numbers.

custom table

Table type that offers a flexible user-defined layout.

D**DFC**

Abbreviation for diagnostic fault checks.

display object

Subunit of a section containing one or more signals. A display object can either be a chart or table.

display type

Setting that allows to define the representation of a specific chart type.

E**EATB**

Abbreviation for ETAS Analytics Toolbox.

EATB Configuration Encrypter

Component delivered with the installation package to encrypt and convert previously defined *.m files to *.eatb files.

EATB Console

Executable file containing only the MATLAB core needed to create reports.

EATB Developer Kit

MATLAB p-code of the EATB core that allows the usage of EATB directly in MATLAB and provides a debugging functionality.

EATB developer license

License variant for advanced users for using the EATB Developer Kit to create and edit configuration files (*.m files or *.eatb files).

EATB runtime license

License variant for using EATB Web and EATB Console to generate reports based on *.eatb files.

EATB Web

User interface supporting creation of configurations and generation of reports.

evaluationResults.json

Part of the results generated by the EATB-Core; it contains the structure of the generated report.

extrapolation

Estimation of subsequent results of a simulation/process using information of the present and past results.

F**function threshold**

As opposed to constant threshold: Threshold type that takes four MATLAB anonymous functions (min, low, high, max) as thresholds, which define the green, yellow, and red ranges. Two signals are needed to calculate a function threshold: The values of the first signal (x axis) are used to calculate the threshold values as functions of this signal and to compare the calculated values with the values of the second signal (y axis).

G**grid**

Sampling time used for interpolation and signal synchronization

H**histogram**

Chart type that represents frequency distributions of certain events or values.

I**inline filter**

As opposed to conditional filter: Filter type that is based on the time (as used in signal processing). Inline filters are always applied to the plotted signals.

interpolation

Estimation of a value inside a set of data points.

interval

Chart type that represents a segment of a signal whose boundaries are determined by one trigger with duration or one start and one end trigger.

IUMPR table

Table type that is used for analyzing DFCs.

M**MDA**

Measure Data Analyzer; ETAS tool that lets users visualize, further process, analyze, and document measurement data.

measured signal

Signal from measurements defined in a config_signals.csv file.

measurement file

File containing measurement data (independent from the actual file format, e.g. MDF).

MinMax table

Table type that shows the evaluation of the global maximum and the global minimum of each signal.

P**percent tolerance**

Tolerance type that defines the minimum or maximum percentage of the points that must or may lie inside or outside the feasible range without violating the thresholds.

plot

Chart type that represents signals in point clouds, combining two signals and displaying them in dependence.

Q**quantity**

Signal quantification step size for signals in a chart with respect to a defined axis. Recommendation: Quantity should be a multiple of grid for time-based charts.

R**results folder**

Folder containing the results of the calculation done by EATB, that means the data points that are visualized in the charts as JSON files and an HTML file of the report.

S

scatter

Extension of the chart type plot. In addition to the classical point cloud, a third signal can be used for evaluation. The third signal is integrated into the point cloud by a color map and displayed on the z axis.

section

Subunit of a chapter containing one or more charts or tables.

signal ID

Signal name as defined by the user (e.g. EngineSpeed).

signal label

Original signal name as defined in the measurement file (e.g. nmot_w); also called MATLAB label since this name is used by MATLAB during internal calculation.

single value bar

Chart type that displays a single value as bar.

single value line

Chart type that displays a single value as line.

T

table

Display object that shows the signals in tabular representation.

threshold

Limit indicating whether evaluated data is located inside or outside some given range or area. Thresholds are visualized with traffic lights.

time tolerance

Tolerance type that defines the maximum time in seconds, for which the time series can leave the feasible range continuously, and the thresholds would still be considered as not violated.

timeplot

Chart type that has time as x axis. It plots the signal values on the y axis in dependence on the time when the signal values were measured.

tolerance type

Option that allows to set the acceptance criteria to the evaluation of traffic lights.

traffic light

Optical indicator that shows if a threshold is violated or not.

trigger

Calculation of a binary mask that, when attached to the signals in a display object, returns only the first points of the signal segments fulfilling the given trigger condition, but only if the trigger condition was not fulfilled at the points before the triggered ones.

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