Industrial & Automotive use
LC Filter Simulator Instruction Manual

ver 1.0

<Table of Contents>>

<Update History>

11/1/2024 Issuance of the 1st edition (ver 1.0)

Device Solutions Business Division
Panasonic Industry Co., Ltd.

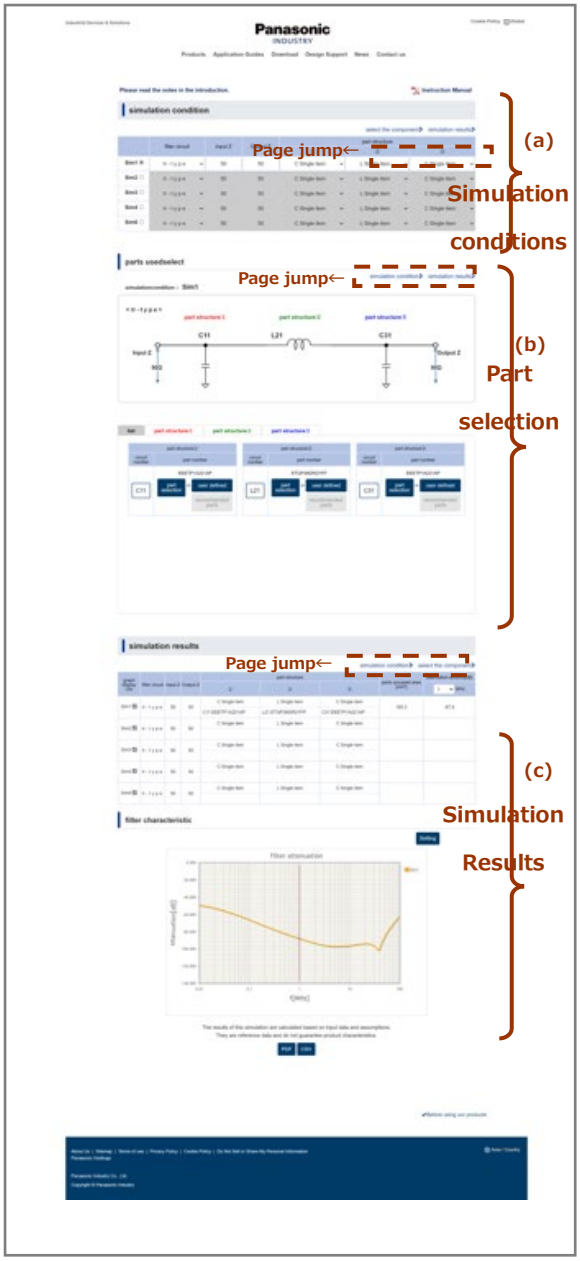
1. What is the Industrial & Automotive use LC Filter Simulator?

The Industrial & Automotive use LC filter simulator enables the simulation of attenuation amounts when configuring a filter using Panasonic's power inductor and aluminum electrolytic capacitor suitable for industrial & automotive use.

2. Features

- π type, T-type, and L-type filter circuits can be simulated.
- Five circuits can be compared at the same time.
- Parallel and series connections of components can also be simulated.
- Data download of configured parts and simulation results are available.

3. Overall Site Structure



The simulator consists of the following three items

(a) Simulation conditions

(b) Part selection

(c) Simulation results

In addition, the “Part selection” allows you to view a single component impedance characteristic graph of the selected components.

A page jump function is provided at the right end of each of the three items.
You can scroll to the place you want to browse with a single click.

The following page describes how to use it.

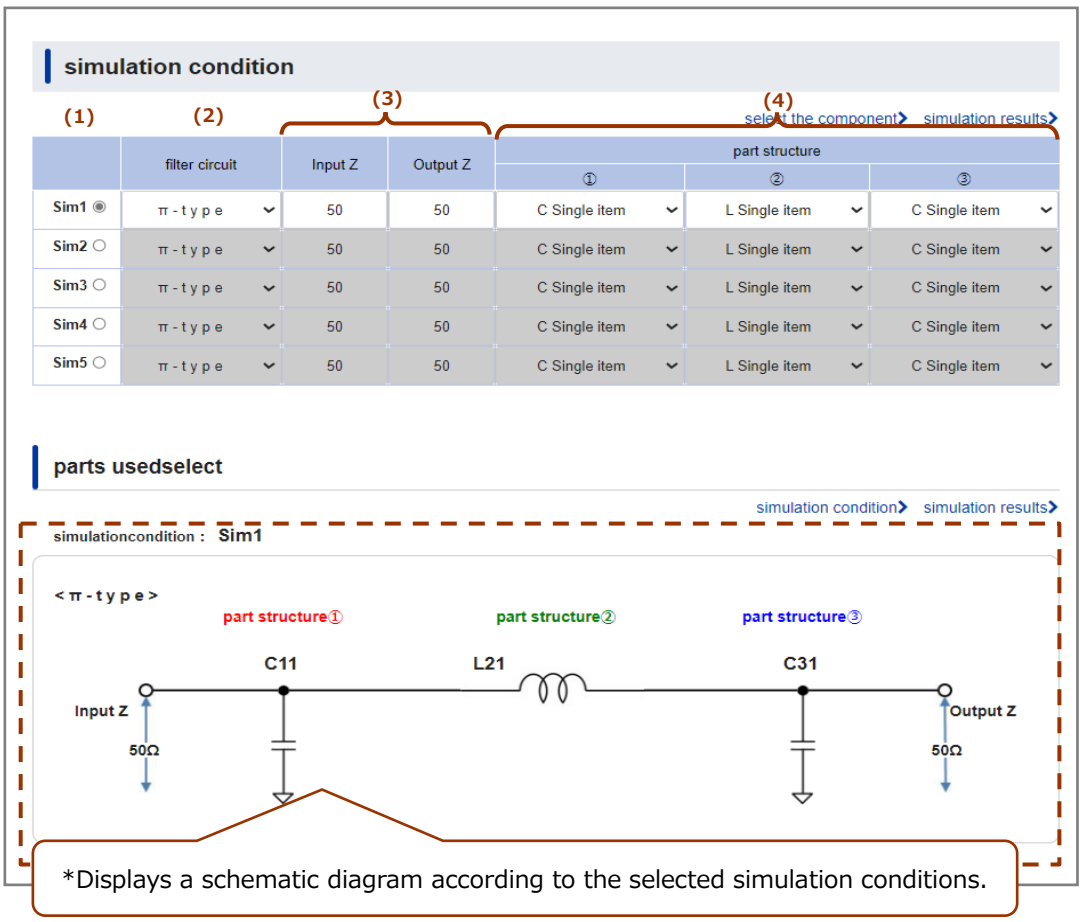
4. How to Use

[4-1] How to set the simulation conditions

The LC Filter Simulator allows you to set simulation conditions for up to 5 circuits (Sim1 to Sim5).

1. Press the Sim1 radio button to configure settings from Sim1.
2. Select the basic configuration of the filter circuit from "π-type", "T-type", and "L-type".
3. Enter the impedance value numerically in the "Input Z" and "Output Z" fields. (Initial value is 50)
4. Set the part configuration ①, ②, and ③. Select each part configuration from the pull-down menu.

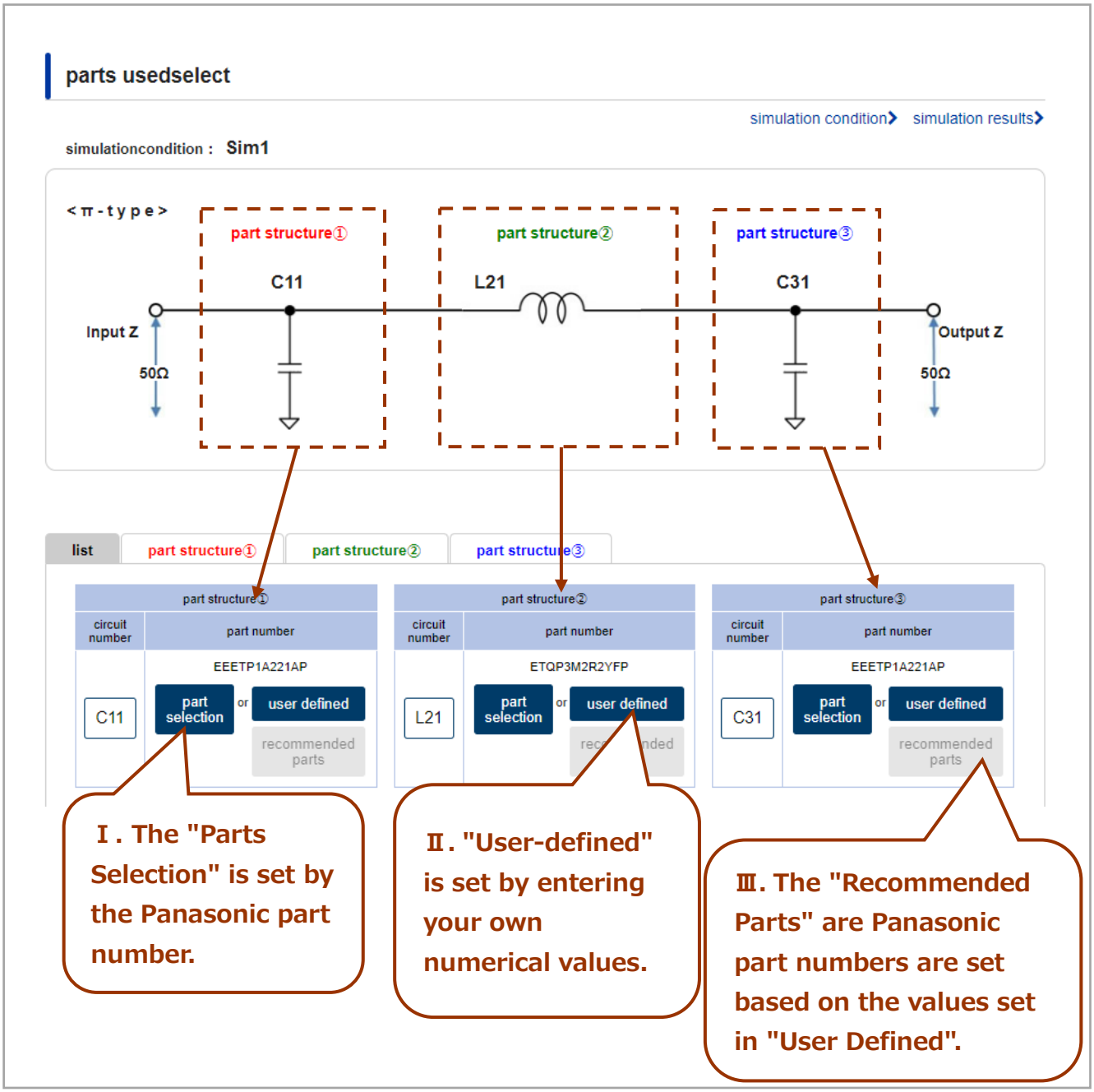
Filter circuit	Part structure		
	①	②	③
Π type	C Single item C parallel2～5	L Single item L parallel2, L series2	C Single item C parallel2～5
T type	L Single item L parallel2, L series22	C Single item C parallel2～5	L Single item L parallel2, L series2
L type	-	L Single item L parallel2, L series2	C Single item C parallel2～5



5. To set multiple simulation conditions, return to step (1). Be sure to set simulation conditions in the order of Sim1, Sim2, Sim3, and so on.

[4-2] How to set up the components

All the parts displayed on the schematic can be set using either "Selected Parts", "User Defined Parts" or "Recommended Parts". “Recommended Parts" can be used only when "User Defined" is selected.



The following pages explain how to set up the parts (the following three types).

Ⅰ. How to set up by "Part Selection" (P.5)

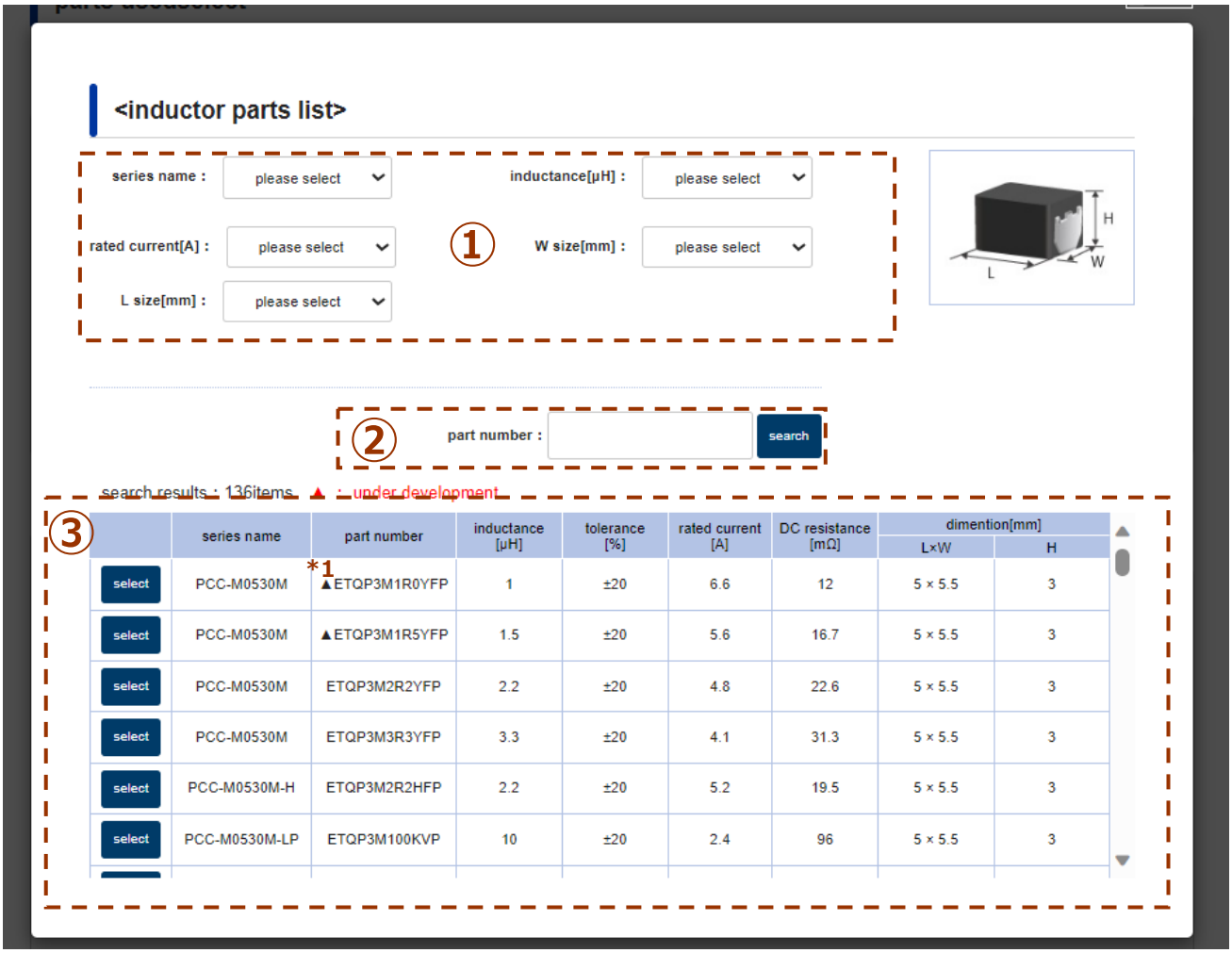
Ⅱ. How to set up by "User-defined" (P.6)

Ⅲ. How to set up by "Recommended Parts” (P.7~8)

Ⅰ. How to set up by "Part Selection"

（1）Click "Select Parts" to display the setting screen. Click "close" in the upper right corner to close the setting screen.

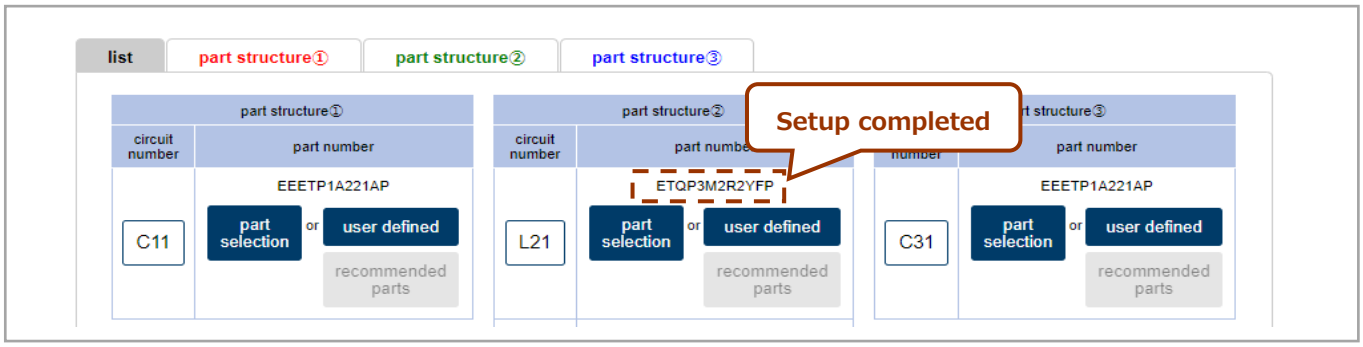
- ③The search results table displays all parts（You can narrow down your search by ① and ②.）
- Part numbers with ▲ at the beginning of the part number in the search result table are under development. *1



（2）You can narrow down the ③"Search Results and List" by setting the series name, size, etc. in the drop-down menu in ①.Search for part numbers by entering one-byte alphanumeric characters in ②. Partial match search is available.

（3）By entering ①“Refine" and ②"Part No. Search", the ③"Number of search results and list" will change. Click "Select" of the part you want to use from the list.

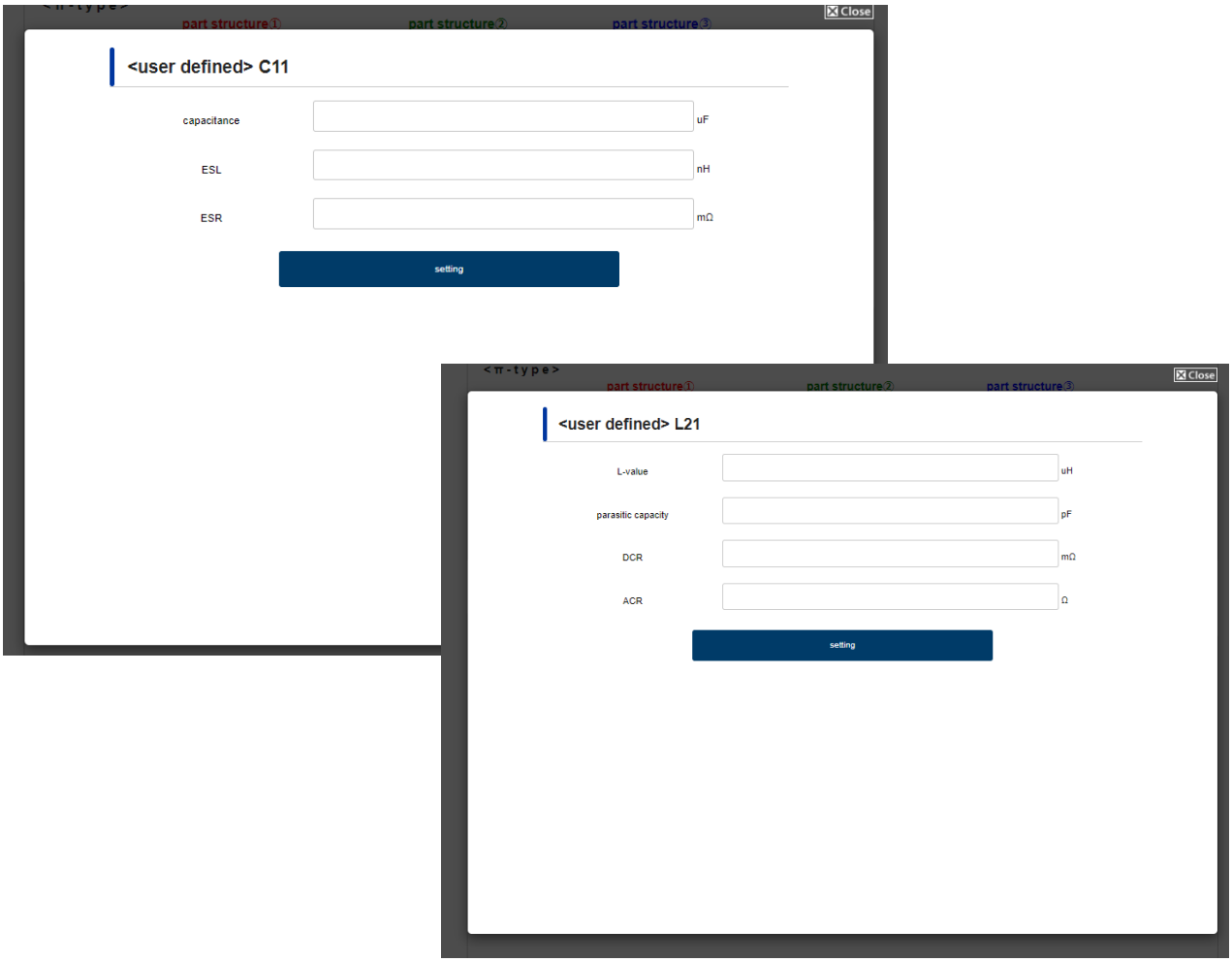
(4) The selected part number will be displayed.



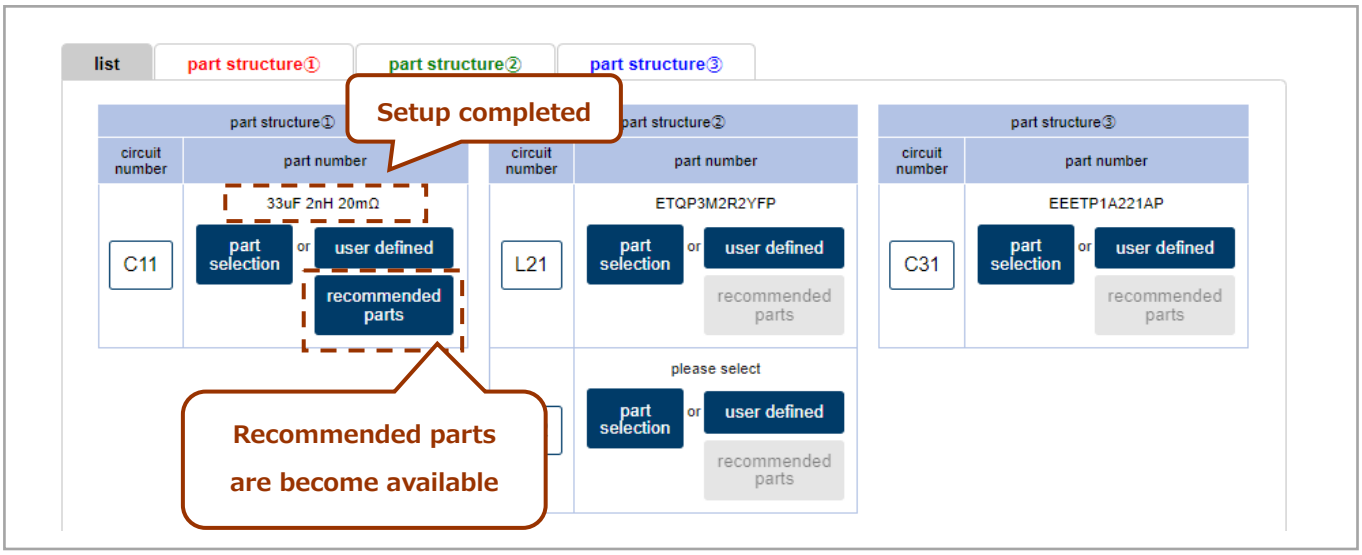
Ⅱ. How to set up by "User-defined"

(1) Press "User Defined" to display the settings screen.

(2) For capacitors, enter "Capacitance," "ESL," and "ESR" in one-byte numbers and press "Setting". For inductors, enter "L value," "Parasitic Capacitance," "DCR," and "ACR" in one-byte numbers, and press "Setting".



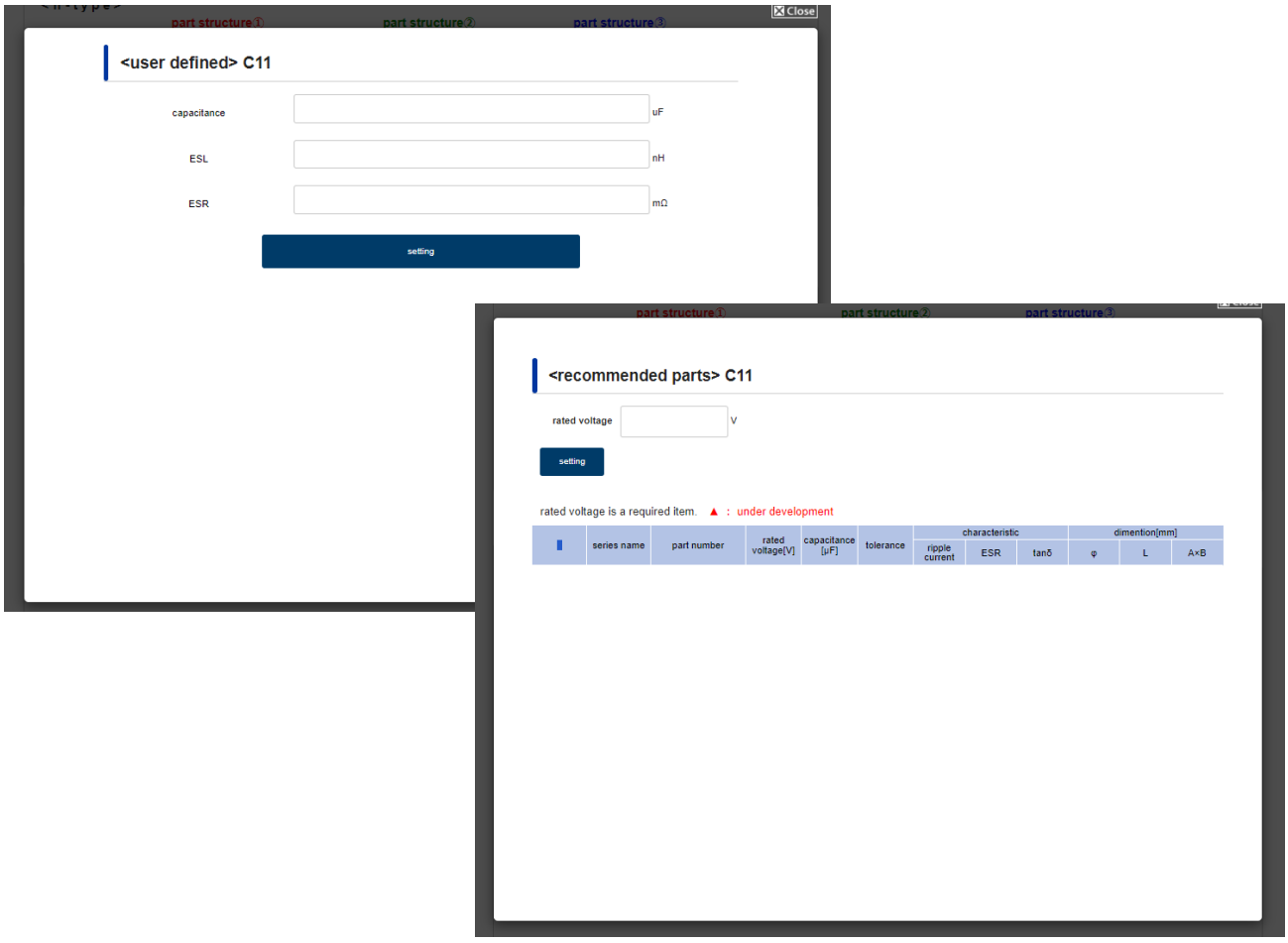
(3) The set value and unit are displayed on the part number.
Since "user-defined" is set, "recommended parts" can be used.



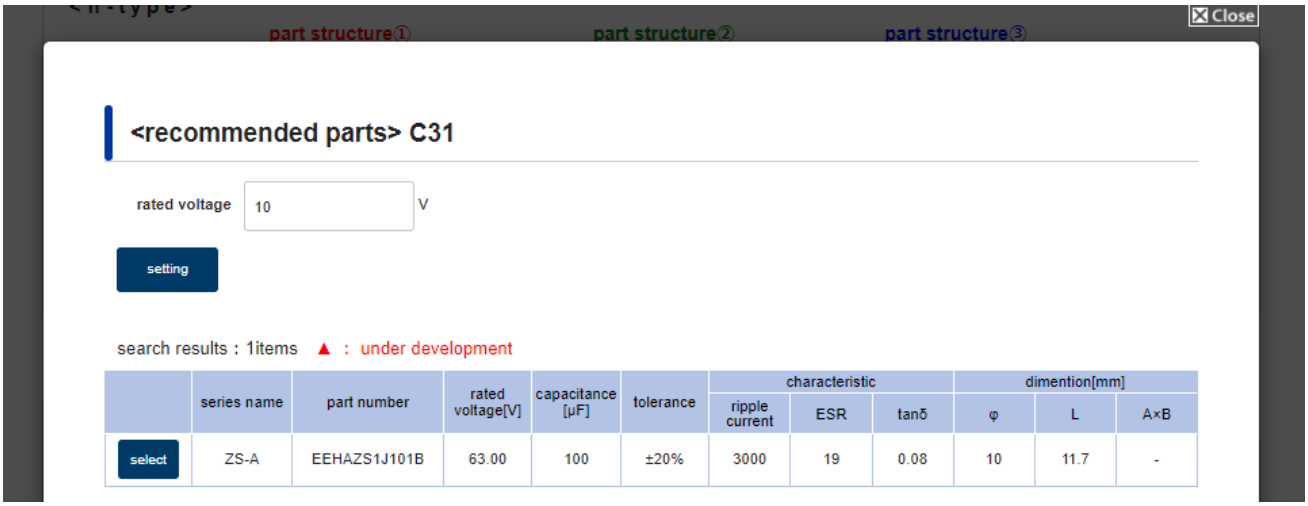
Ⅲ. How to set up by "Recommended Parts"

(1) After setting "User Defined", click "Recommended Parts" to display the setting screen.

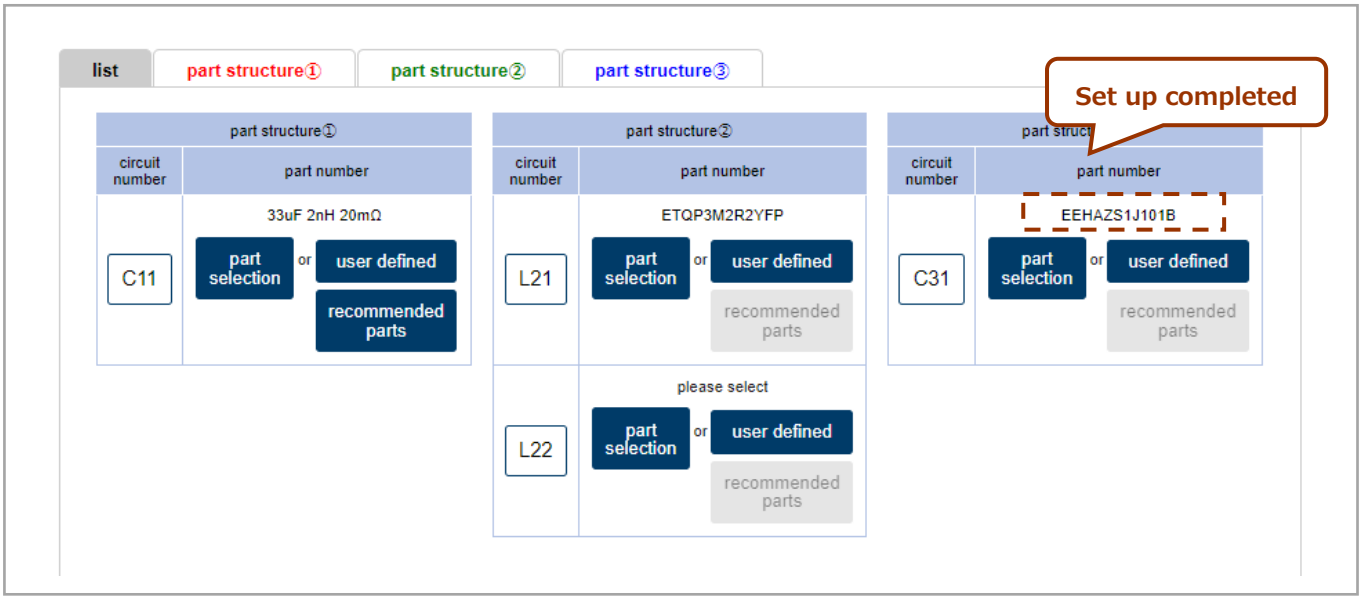
(2) Enter the "Rated voltage" for capacitors and the "Rated current" for inductors using one-byte numbers, and click "Setting".



(3) Click "Select" of the part you want to use from the list of search results.



(4) Displays the part number of the selected recommended part.



[4-3] View the part information you have set up

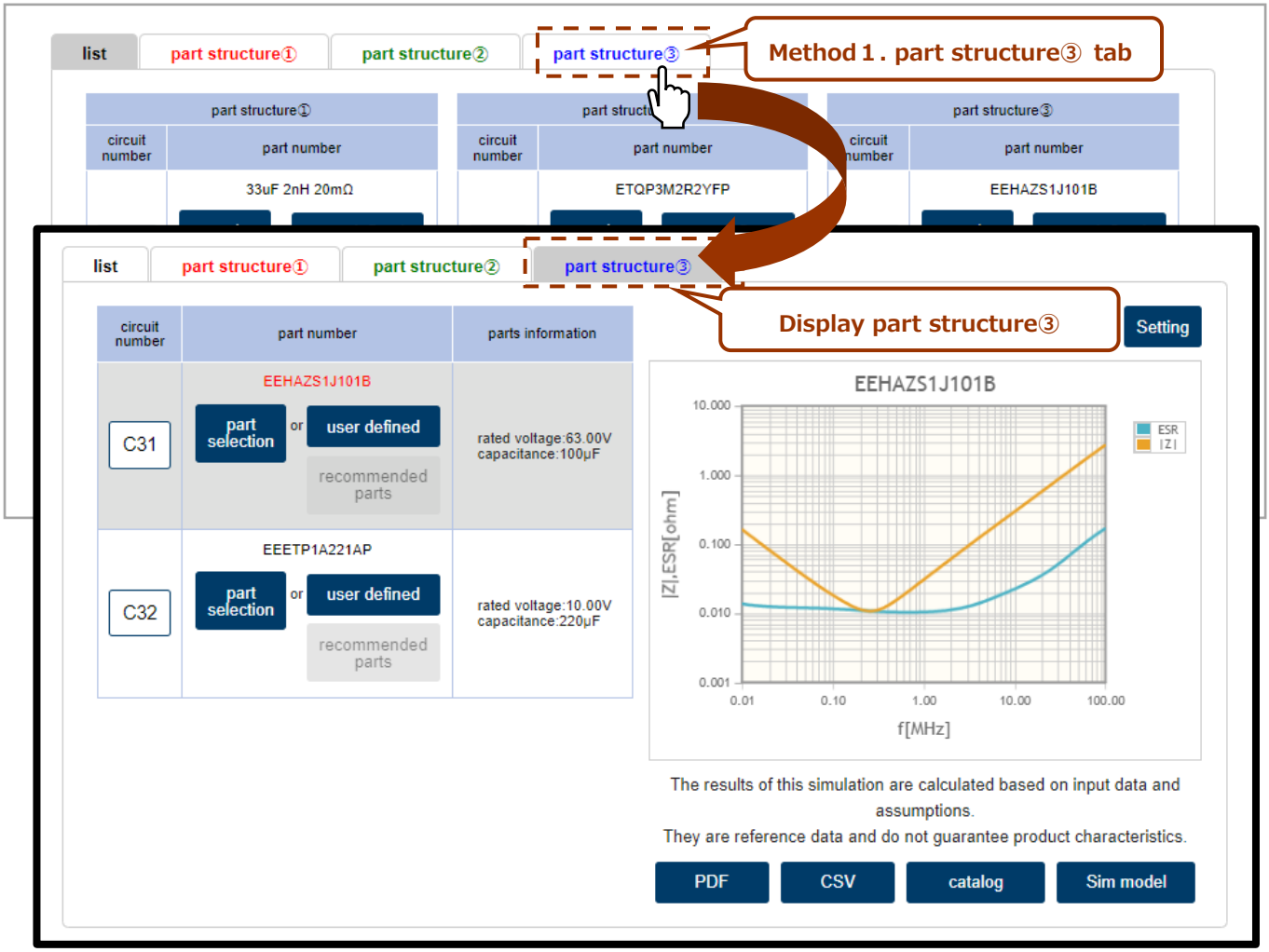
(1) There are two ways to view the part information you have set up.

・Viewing method 1: By pressing the “Part Structure” tab.

・Viewing method 2: Press "Circuit No. (button)" or "Part No. (text link)" to display.

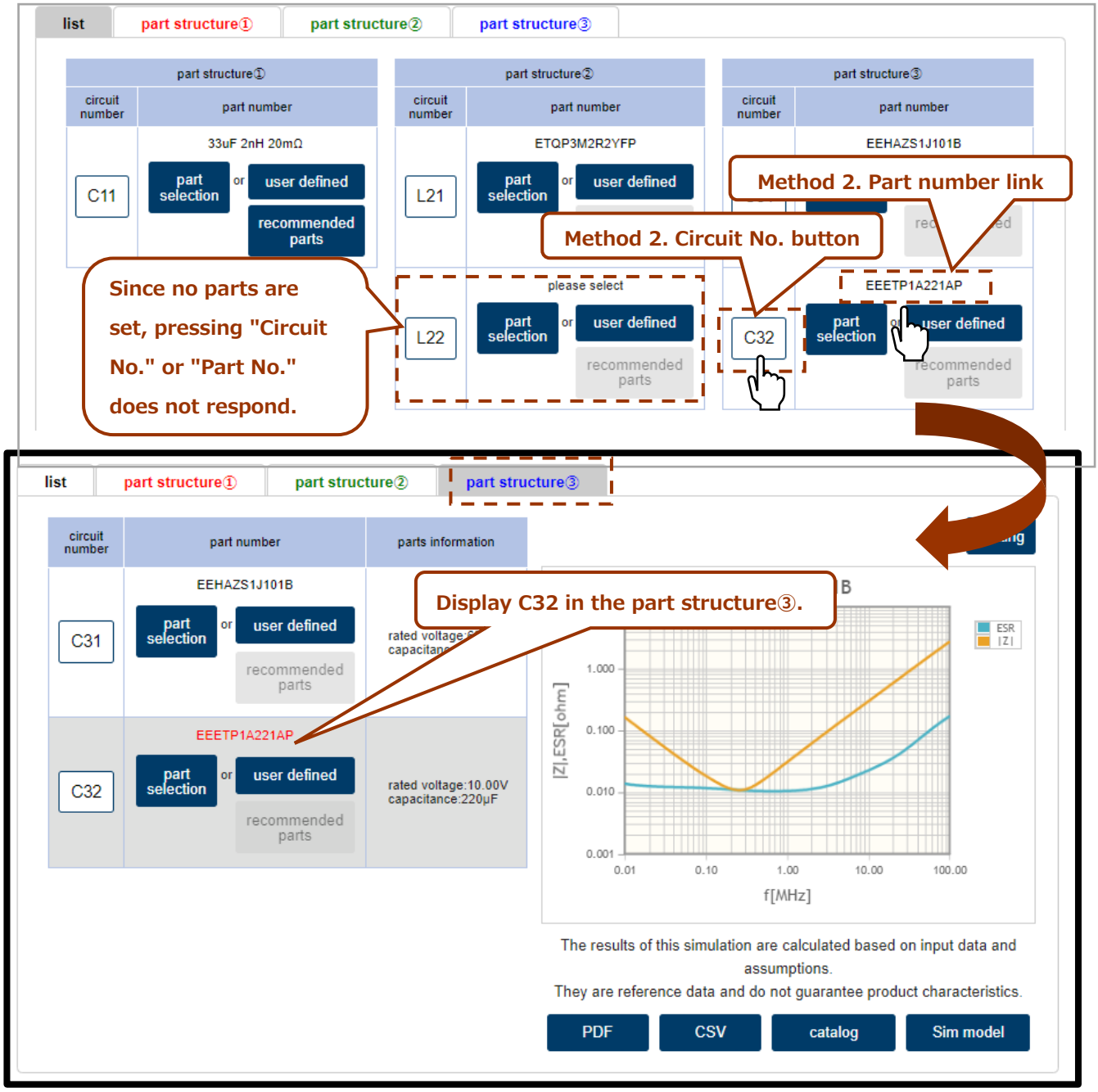
《Viewing method 1: By pressing the “Part Structure” tab》

Example: Click the tab " Part Structure③" to display " Part Structure③".



《Viewing Method 2: Click on the "Circuit No. (button)" or "Part No. (text link)" 》

- When a part number is set, "Circuit No." changes to a button and "Part No." changes to a text link.
- The "Circuit No." and "Part No. (Please select)" with no part number set will not respond even if they are pressed.
  - For example, L22 does not respond when "Circuit No." or "Part No." is pressed because the part has not yet been set.
  - For other than L22, parts have already been set, so pressing the "Circuit No." and "Part No." will change the display.

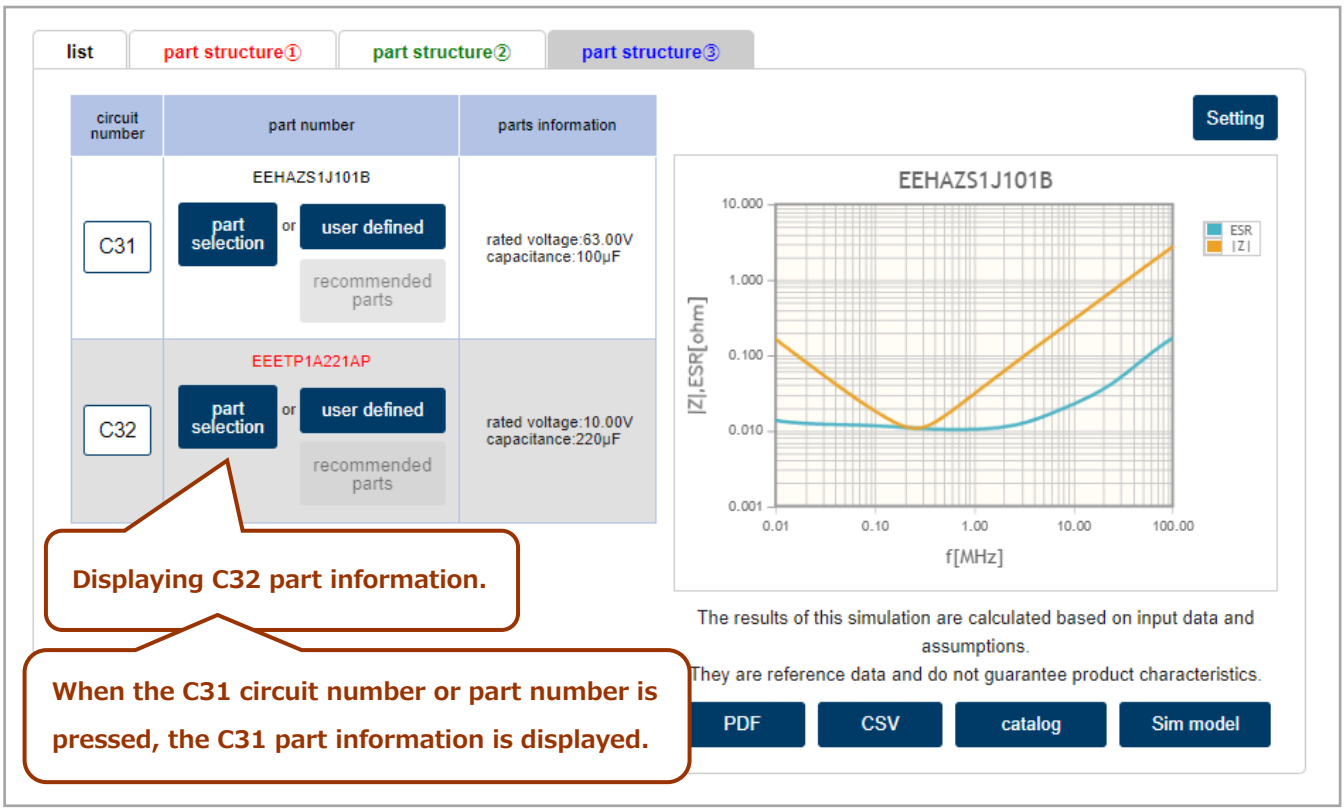


[4-3] View the part information you have set up

（2）The part being viewed is displayed with a gray background and the part number in red.

（2-1）Pressing "Circuit No." or "Part No." toggles the display of the part to be viewed.

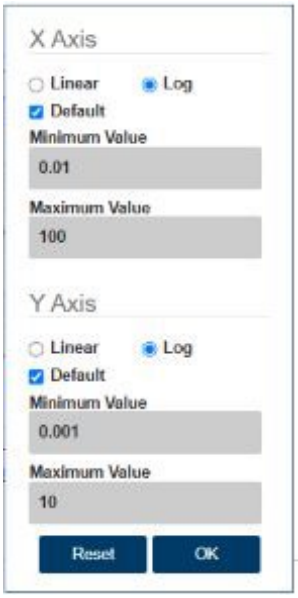
（2-2）To view part information for a different part structure, click the "Part Structure" tab, or click the "List" tab, and then click the "Circuit Number" or "Part Number" of the part you want to view. Click the "Circuit No." or "Part No." of the component you want to view to switch the display.



(3) You can change the display scale of the horizontal and vertical axis of the graph by clicking "Setting" in the upper right corner of the impedance graph.

The settable range differs between capacitors and inductors.

《For capacitors》



Horizontal axis (X Axis)

Linear : Displays the scale at equal intervals.

Log : Set the scale to logarithmic.

Default (checked) : Initial value (min. 0, max. 100)

Default (unchecked) : Minimum and maximum values can be entered

→Minimum Value: 0.01

→Maximum Value: 1000

Vertical axis (Y Axis)

Linear : Displays the scale at equal intervals.

Log : Set the scale to logarithmic.

Default (checked) : Initial value (min. 0.001, max. 10)

Default (unchecked) : Minimum and maximum values can be entered

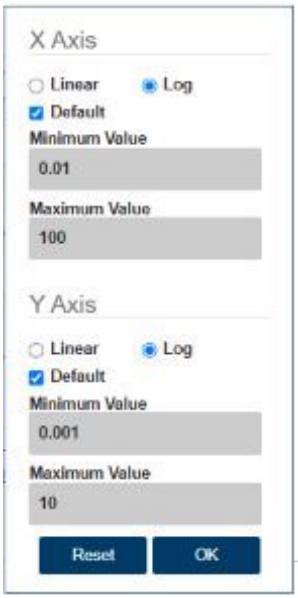
→Minimum Value: 0.001

→Maximum Value: 10

Reset : Restore the impedance graph to the display before the Setting operation.

OK : Change the graph X-axis and Y-axis to the setting values and display them.

《For inductor》



Horizontal axis（X Axis）

Linear : Displays the scale at equal intervals.

Log : Set the scale to logarithmic.

Default（checked） : Initial value (min. 0.01, max. 100)

Default（unchecked） : Minimum and maximum values can be entered

→Minimum Value : 0.01

→Maximum Value : 1000

Vertical axis（Y Axis）

Linear : Displays the scale at equal intervals.

Log : Set the scale to logarithmic.

Default（checked） : Initial value (min. 0.01, max. 100000)

Default（unchecked） : Minimum and maximum values can be entered

→Minimum Value : 0.01

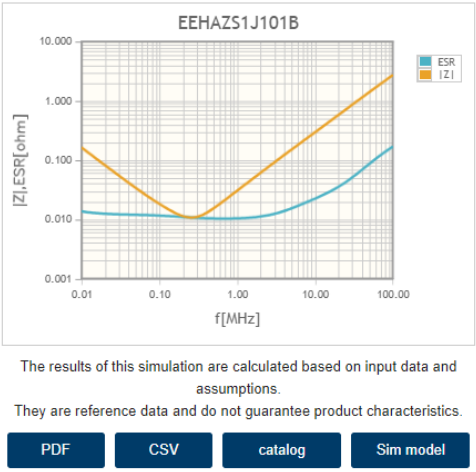
→Maximum Value : 100000

Reset : Restore the impedance graph to the display before the Setting operation.

OK : Change the graph X-axis and Y-axis to the setting values and display them.

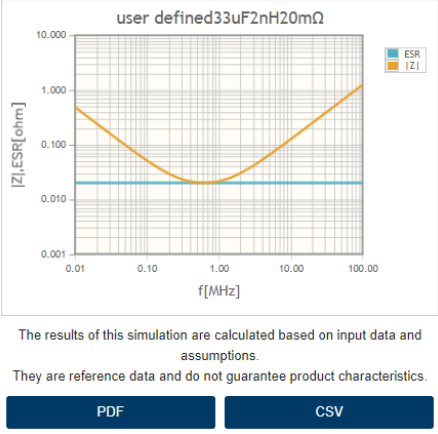
(4) A button for downloading data is displayed below the graph. (The contents of the display will vary depending on how the component is set up.)

《For "Parts Selection" and "Recommended Parts"》



PDF	Outputs a graph image of the configured parts in PDF format.
CSV	Outputs numerical data of configured parts in Excel format.
Catalog	Displays the catalog for configuration parts in a separate tab.*Part numbers under development are displayed on the Product Under Development page instead of the catalog page.
Sim model	Outputs simulation models (S-parameters, etc.) of configuration parts in Zip format.

《For "user-defined"》



PDF	Outputs a graph image of the configured parts in PDF format.
CSV	Outputs numerical data of configured parts in Excel format.

[4-4] View Simulation Results

After setting all the components, simulation results (list) and filter attenuation graphs are displayed.

(1) Circuits with graph display ON checked are displayed in the filter attenuation graph.

(2) The parts set in the simulation conditions and the selection of parts to be used are displayed.

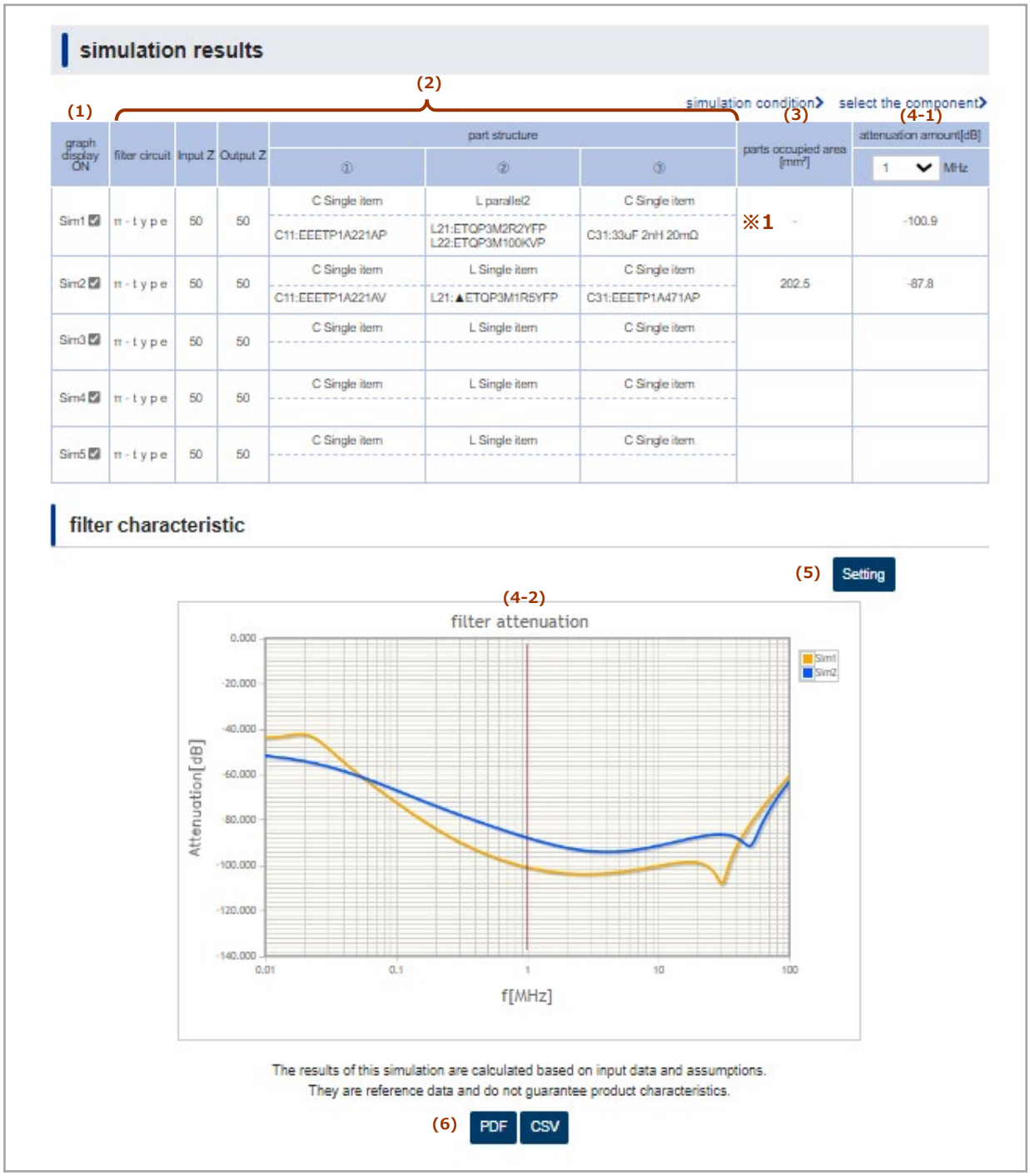
(3) Displays the part proprietary surface (sum of all parts). Items containing user definitions are displayed with a hyphen. *1

(4-1) Attenuation is displayed at 1 MHz as default, and the frequency can be changed by pull-down.

(4-2) Draws a vertical line on the X axis where the frequency selected for attenuation and the filter attenuation graph intersect.

(5) The display range of the filter attenuation graph can be changed by "Setting". *2

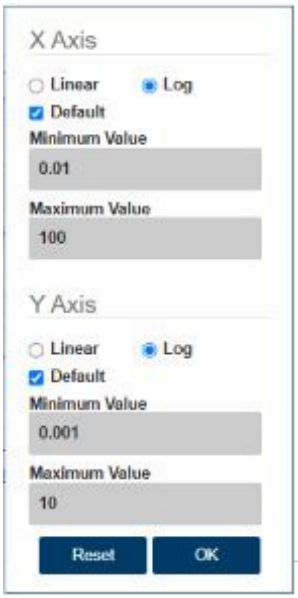
(6) A button for data download is displayed below the graph. *3



*2. The display range of the filter attenuation graph can be changed by "Setting".

Setting" is a function to change the display scale of the horizontal axis (X Axis) and the vertical axis (Y Axis) of the graph.

《Filter attenuation》



Horizontal Axis (X Axis)

Linear : Displays the scale at equal intervals.

Log : Set the scale to logarithmic.

Default（checked） : Initial value (min. 0.01, max. 100)

Default（unchecked） : Minimum and maximum values can be entered

→Minimum Value: 0.01

→Maximum Value:1000

Vertical Axis (Y Axis)

Linear : Displays the scale at equal intervals.

Log : Set the scale to logarithmic。

Default（checked） : Initial value (min. -140.0, max. 0)

Default（unchecked） : Minimum and maximum values can be entered

→Minimum Value : -200.0

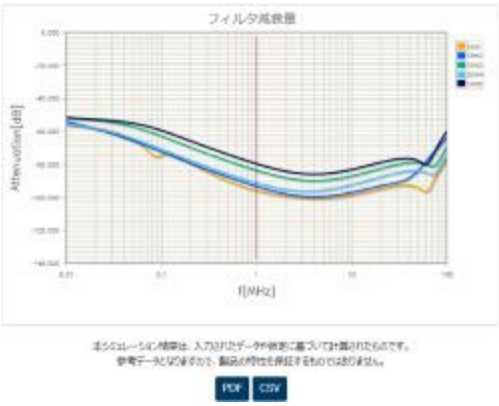
→Maximum Value : 0

Reset : Restore the impedance graph to the display before the Setting operation.

OK : Change the graph X-axis and Y-axis to the setting values and display them.

*3. Displays a button for downloading data below the graph

《filter attenuation》



PDF	Output filter attenuation graph images in PDF format.
CSV	Output numerical data of simulation results in Excel format.