



SimSurfing
Noise Filter Design Support Tool Plus
Operation Manual

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Murata Manufacturing Co., Ltd.



	Page
1. Tool Information	3
<u>1-1. Overview</u>	4
<u>1-2. Tool start-up and screen layout</u>	5
2. Try it Out	7
<u>2-1. Instructions for each component: 3 steps</u>	8
<u>2-2. Displayed results</u>	11
3. Advanced Features	12
<u>3-1. You can change the number of filter elements and the wire connection method.</u>	13
<u>3-2. You can select items as you like.</u>	15
<u>3-3. You can fix/remove filters during optimization, and specify the chip size.</u>	16
<u>3-4. You can compare multiple circuit configurations.</u>	17
<u>3-5. You can output data.</u>	18

	Page
1. Tool Information	3
<u>1-1. Overview</u>	4
<u>1-2. Tool start-up and screen layout</u>	5
2. Try it Out	7
<u>2-1. Instructions for each component: 3 steps</u>	8
<u>2-2. Displayed results</u>	11
3. Advanced Features	12
<u>3-1. You can change the number of filter elements and the wire connection method.</u>	13
<u>3-2. You can select items as you like.</u>	15
<u>3-3. You can fix/remove filters during optimization, and specify the chip size.</u>	16
<u>3-4. You can compare multiple circuit configurations.</u>	17
<u>3-5. You can output data.</u>	18

1. Tool Information

1-1. Overview

- What you can do with this tool

With this tool, you can select items from our components suitable for consumer and vehicle-mounted power sources and display **recommended items** for filter circuits that are components of such configurations, **display a graph of insertion loss characteristics**, and **display the mounting area**.

Murata components
Power Inductors (L)
Chip Ferrite Bead (BEAD)
Common Mode Choke Coils (CMCC)
Multilayer Ceramic Capacitors (MLCC)
3-terminal Capacitors (3-Term.C)

- Features

- ✓ Select the circuit conditions and insertion loss characteristics that you want to check, and then display the recommended items with the click of a single button.
- ✓ You can select the frequency range for which you want to reduce noise, filter circuit configuration (up to 8 elements), and items as you like, and then compare and display the insertion loss and mounting area.

1. Tool Information

1-2. Tool start-up and screen layout

- Click [Noise Filter Design Support Tool] on the SimSurfing top page to display the tool window.

The image shows the SimSurfing Design Support Software interface. The main window is titled "Design Support Software 'SimSurfing'" and features a navigation menu with various tool categories. A red arrow points from the "Noise Filter Design Support Tool Plus" icon in the "Selection Tool" section to a detailed view of the tool's settings and simulation results.

Design Support Software "SimSurfing"

English | muRata

Products page top | Design Tools page top

Characteristics Viewer

- Multilayer Ceramic Capacitors
- Three-terminal Capacitors
- Lead type Ceramic Capacitors
- Resin Molding SMD Type Ceramic Capacitors
- Polymer Capacitors
- RF Inductors
- Power Inductors
- Ferrite Beads
- Common mode Choke Coils

Selection Tool

- Medium voltage Capacitor Selection Tool
- DC-DC Converter Design Support Tool
- Noise Filter Design Support Tool
- Noise Filter Design Support Tool Plus**
- Bias-T Design Tool
- IC-Timing Device Search Tool
- NTC Thermistor Performance Simulator
- PTC Thermistor Performance Simulator

Noise Filter Design Support Tool Plus

Setting

Application: Power Safety for Automotive

Rated Current(I_{dc}): 10 [A]

Rated Voltage(V_{dc}): 50 [V]

Ambient Temperature: 12 [degC]

Target Noise Frequency

- Select
- 0.15MHz - 10MHz (LW/MW/SW band, etc.)
- 20MHz - 300MHz (FM band/VHF/Band3, etc.)
- 300MHz - 1GHz (DAB/GPS band, etc.)

Start | Stop

Target	Start	Stop
Target1	MHz	MHz
Target2	MHz	MHz
Target3	MHz	MHz

Circuit Pattern - Sim.1

Optimize | Delete | Copy | Paste

Max. T Size: Free [mm]

Circuit Type: C + CMCC + C + L/Bead + C

1 CMCC 2 C 3 L/Bead 4 C 5 C 6 C 7 C 8 C

Straddle Straddle Upper Straddle

Port 1 Port 2 Port 3 Port 4

P/N	Optimize Setup	Status	Size Code[mm]
1 Select GCH15SLBEH104KE07	Optim	Free	
2 Select PLT10HH40100PN	Optim	Free	
3 Select GCH15SLBEH104KE07	Optim	Free	
4 Select* BLM315NS00SH1	Optim	Free	
5 Select GCH15SLBEH104KE07	Optim	Free	
6 Select	None		
7 Select	None		
8 Select	None		

Differential Mode Insertion Loss

Common Mode Insertion Loss

ChipSizes

sim	Total T Max.	[mm ²]	[mm]	Selected Items
sim1	91.76	[mm ²]	9.40	Selected Items
sim2		[mm ²]	[mm]	Selected Items
sim3		[mm ²]	[mm]	Selected Items
sim4		[mm ²]	[mm]	Selected Items
sim5		[mm ²]	[mm]	Selected Items

1. Tool Information

1-2. Tool start-up and screen layout

- This tool consists of 5 elements.

Select/Settings

- (a) Condition selection
- (b) Circuit configuration

Output

- (c) Recommended item display
- (d) Insertion loss display
- (e) Mounting area display

The screenshot displays the 'Noise Filter Design Support Tool Plus' interface. It is divided into several sections:

- (a) Setting:** Includes 'Application' (Powertrain/safety for Automotive), 'Rated Current (Idc)' (10 A), 'Rated Voltage (Vdc)' (50 V), and 'Ambient Temperature' (12 degC). The 'Target Noise Frequency' section has radio buttons for 'Select' (0.15MHz - 10MHz, 20MHz - 300MHz, 300MHz - 1GHz) and 'Edit'.
- (b) Circuit Pattern - Sim.1:** Shows a circuit diagram with components like capacitors, inductors, and straddles. The 'Circuit Type' is 'C + CMCC + C + L/Bead + C'. There are 8 numbered slots for component selection.
- (c) Recommended item display:** A table showing component selection options.

	P/N	Optimize Setup	Status	Size Code[mm]
Select	GCM155L8EH104KE07	Optim	Free	Free
Select	PLT10HH401100PN	Optim	Free	Free
Select	GCM155L8EH104KE07	Optim	Free	Free
Select	BLM31SN500SH1	Optim	Free	Free
Select	GCM155L8EH104KE07	Optim	Free	Free
Select	-	None	-	-
Select	-	None	-	-
Select	-	None	-	-
- (d) Insertion loss display:** Two graphs showing 'Differential Mode Insertion Loss' (S12/Sds12[dB]) and 'Common Mode Insertion Loss' (Scc12[dB]) versus 'Frequency[Hz]' on a log scale from 100k to 1G.
- (e) Mounting area display:** A table showing 'Ch. Sizes' for five items (im1 to im5).

Item	Total	T Max.	Selected Items
im1	91.76 [mm ²]	9.40 [mm]	Selected Items
im2	- [mm ²]	- [mm]	Selected Items
im3	- [mm ²]	- [mm]	Selected Items
im4	- [mm ²]	- [mm]	Selected Items
im5	- [mm ²]	- [mm]	Selected Items

	Page
1. Tool Information	3
<u>1-1. Overview</u>	4
<u>1-2. Tool start-up and screen layout</u>	5
2. Try it Out	7
<u>2-1. Instructions for each component: 3 steps</u>	8
<u>2-2. Displayed results</u>	11
3. Advanced Features	12
<u>3-1. You can change the number of filter elements and the wire connection method.</u>	13
<u>3-2. You can select items as you like.</u>	15
<u>3-3. You can fix/remove filters during optimization, and specify the chip size.</u>	16
<u>3-4. You can compare multiple circuit configurations.</u>	17
<u>3-5. You can output data.</u>	18

2. Try it Out

2-1. Instructions for each component: 3 steps(1/3)

(a) Condition selection	Select the application, rated current/rated voltage, and target noise frequency band
(b) Circuit configuration	Filter circuit configuration
(c) Item selection	Circuit configuration element item selection
(d) Insertion loss display	Differential mode and common mode (when CMCC is selected) insertion loss graph display

(a) Condition selection

Select conditions using Setting. See the operating instructions.

Setting

Application ?

Rated Current(Idc) [A] ?

Rated Voltage(Vdc) [V] ?

Ambient Temperature [degC] ?

How to operate

- 1 Select the application.
- 2 Select the L, BEAD, and CMCC rated current from the pull-down menu.
- 3 Select the C and CMCC rated voltage from the pull-down menu.
- 4 Select the ambient temperature.

Note: For details on terms, click the ?

2. Try it Out

2-1. Instructions for each component: 3 steps(2/3)

(a) Condition selection

Configure the Target Noise Frequency conditions.

Select [Edit] from the lower section to set your preferred frequency. See the operating instructions.

Note: For details on terms, click the 

Target Noise Frequency

Select 

0.15MHz - 10MHz (LW/MW/SW band, etc.)

20MHz - 300MHz (FM band/VHF/Band3, etc.)

300MHz - 1GHz (DAB/GPS band, etc.)

Edit

	Start		Stop			
Target1		MHz	▼		MHz	▼
Target2		MHz	▼		MHz	▼
Target3		MHz	▼		MHz	▼

How to operate

Choose [Select] and then select the frequency range you want to check.

Target Noise Frequency

Select 

0.15MHz - 10MHz (LW/MW/SW band, etc.)

20MHz - 300MHz (FM band/VHF/Band3, etc.)

300MHz - 1GHz (DAB/GPS band, etc.)

Edit

	Start		Stop			
Target1	10	MHz	▼	50	MHz	▼
Target2		MHz	▼		MHz	▼
Target3		MHz	▼		MHz	▼

How to operate

Select [Edit] to set your preferred frequency.

2. Try it Out

2-1. Instructions for each component: 3 steps(3/3)

(b) Circuit configuration

Select up to 8 elements from L, BEAD, CMCC, and C to configure the filter circuit for whose insertion loss you want to calculate.

How to operate

How to configure a new circuit

- 1 Select your preferred filter configuration from the [Create circuit] pop-up menu.
(The filter circuit diagram is automatically displayed below.)
- 2 If there are circuit component product height restrictions, you can select from [2 Max. T Size].

Max. T Size: Free [mm]

Circuit Type: C + CMCC + C + L/Bead + C

1	2	3	4	5	6	7	8
C	CMCC	C	L/Bead	C	-	-	-
Straddle	-	Straddle	Upper	Straddle	-	-	-

Port 1 (Signal output), Port 2, Port 3 (Signal input), Port 4

Circuit symbol descriptions

L	Power Inductors
BEAD	Chip Ferrite Bead
CMCC	Common Mode Choke Coils
C	Multilayer Ceramic Capacitors
3-Term.C	3-terminal Capacitors

2. Try it Out

2-2. Displayed results

(d) Insertion loss display

The recommended items, insertion loss, and mounting area are calculated from the set/selected circuit configuration.

You can check the detailed specifications of selected items using the [Selected Items] button on the bottom right.

Max. T Size: Free [mm]

Circuit Type: C + CMCC + C + L/Bead + C

	P/N	Optimize Setup
		Status Size Code[mm]
1 Select	GCM155L8EH104KE07	Optim Free
2 Select	PLT10HH401100PN	Optim Free
3 Select	GCM155L8EH104KE07	Optim Free
4 Select	BLM31SN500SH1	Optim Free
5 Select	GCM155L8EH104KE07	Optim Free
6 Select		None
7 Select		None
8 Select		None

How to operate

- 1 Click the [Optimize] button.
- 2 The recommended items, insertion loss graph, and mounting area are displayed.

Differential Mode Insertion Loss

Sim1,Sds12.

Common Mode Insertion Loss

Sim1,Scc12.

ChipSize	Total	T Max.	Selected Items
sim1	102.58 [mm ²]	9.40 [mm]	Selected Items
sim2	- [mm ²]	- [mm]	Selected Items
sim3	- [mm ²]	- [mm]	Selected Items
sim4	- [mm ²]	- [mm]	Selected Items

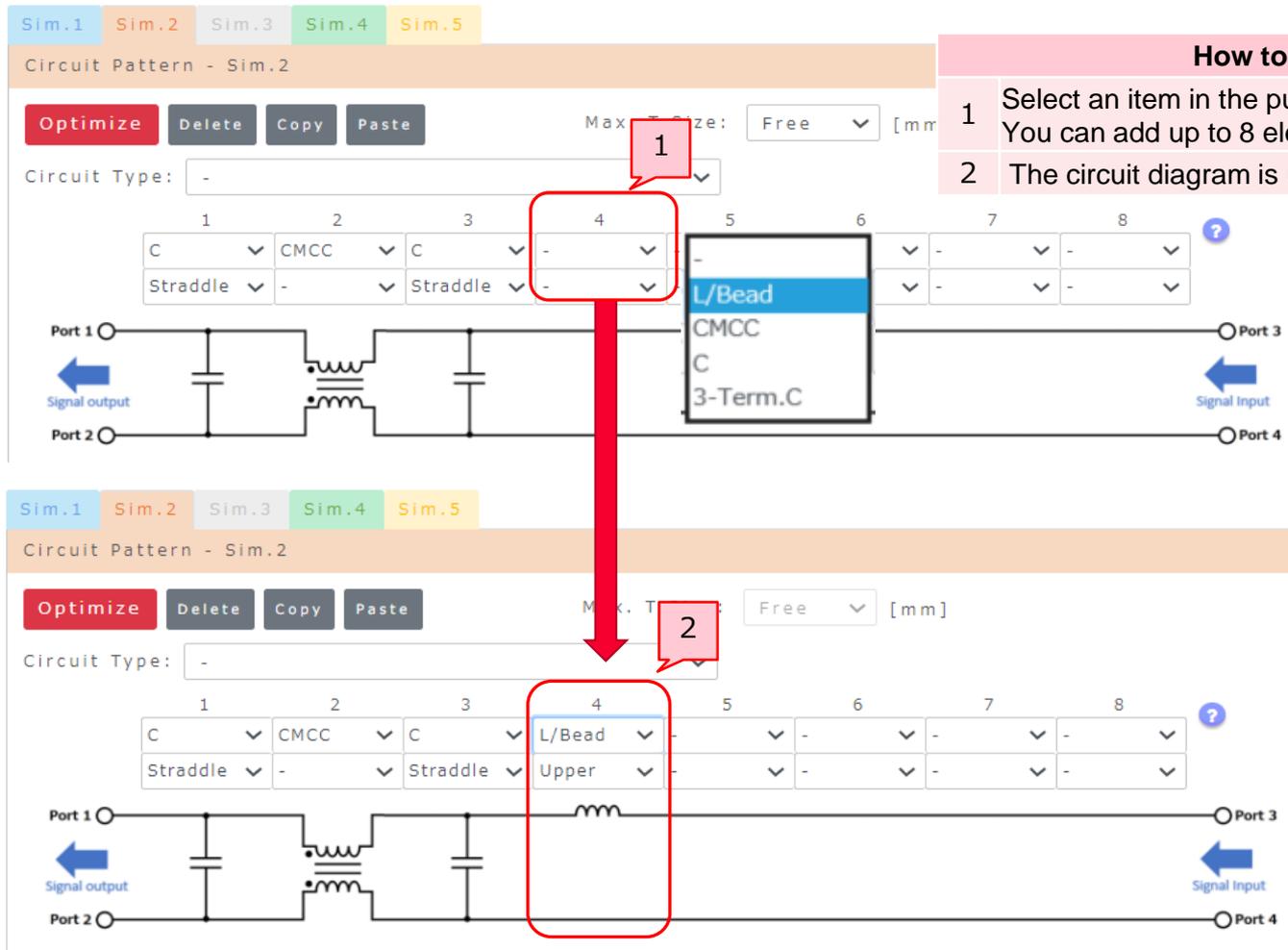
	Page
1. Tool Information	3
<u>1-1. Overview</u>	4
<u>1-2. Tool start-up and screen layout</u>	5
2. Try it Out	7
<u>2-1. Instructions for each component: 3 steps</u>	8
<u>2-2. Displayed results</u>	11
3. Advanced Features	12
<u>3-1. You can change the number of filter elements and the wire connection method.</u>	13
<u>3-2. You can select items as you like.</u>	15
<u>3-3. You can fix/remove filters during optimization, and specify the chip size.</u>	16
<u>3-4. You can compare multiple circuit configurations.</u>	17
<u>3-5. You can output data.</u>	18

3. Advanced Features

3-1. You can change the number of filter elements and the wire connection method.

How to change the number of filter elements

You can change the circuit configuration diagram item configuration from the pull-down menu.



How to operate

- 1 Select an item in the pull-down menu. You can add up to 8 elements.
- 2 The circuit diagram is updated.

State 1 (Top): Circuit Type: -
Max. T. Size: Free [mm]
Circuit Type: -
1: C, Straddle; 2: CMCC, -; 3: C, Straddle; 4: L/Bead, CMCC; 5: C, 3-Term.C; 6: -; 7: -; 8: -

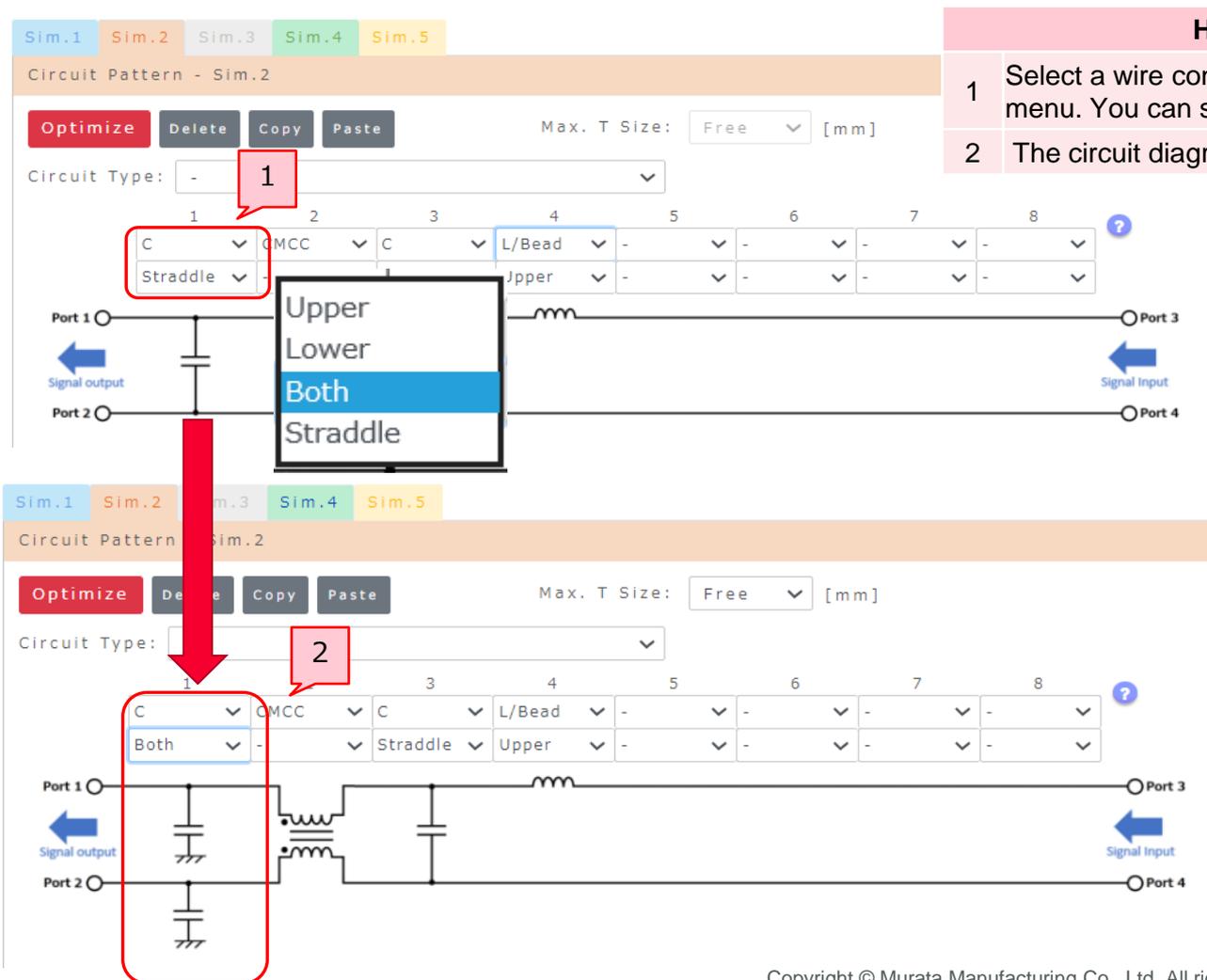
State 2 (Bottom): Circuit Type: -
Max. T. Size: Free [mm]
Circuit Type: -
1: C, Straddle; 2: CMCC, -; 3: C, Straddle; 4: L/Bead, Upper; 5: -; 6: -; 7: -; 8: -

3. Advanced Features

3-1. You can change the number of filter elements and the wire connection method.

How to change the number of filter elements

You can change the circuit configuration diagram item configuration.



- | How to operate | |
|----------------|---|
| 1 | Select a wire connection method in the pull-down menu. You can select from 4 types. |
| 2 | The circuit diagram is updated. |

3. Advanced Features

3-2. You can select items as you like.

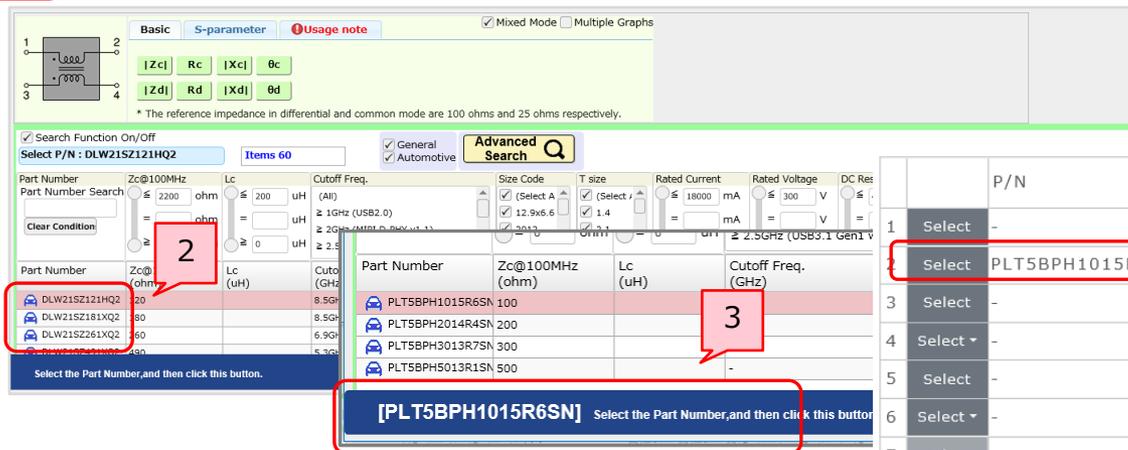
How to change the selected filter

Selection of items for each element configured in the circuit is handled in mini SimSurfiing. You can select items with specified values and ranges for each electrical characteristic.

	P/N	Optimize Status	Setup Size
1	Select	Optim.	Free
2	Select	Optim.	Free
3	Select	Optim.	Free
4	Select	Optim.	Free
5	Select	Optim.	Free
6	Select	Optim.	Free
7	Select	None	
8	Select	None	

How to operate

- 1 Click the [Select] button.
- 2 Select items in the mini SimSurfiing pop-up.
- 3 Click the confirmation bar at the bottom of mini SimSurfiing.
- 4 Close mini SimSurfiing and return to the tool window.



The screenshot shows the mini SimSurfiing interface with various search filters like Zc@100MHz, Lc, and Cutoff Freq. A list of components is displayed, including DLW21SZ121HQ2 and PLT5BPH1015R6SN. A confirmation bar at the bottom contains the text "[PLT5BPH1015R6SN] Select the Part Number, and then click this button."

	P/N	Optimize Status	Setup Size
1	Select	Optim.	Free
2	Select	Optim.	Free
3	Select	Optim.	Free
4	Select	Optim.	Free
5	Select	Optim.	Free
6	Select	Optim.	Free
7	Select	None	
8	Select	None	

3. Advanced Features

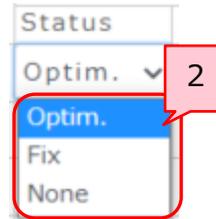
3-3. You can fix/remove filters during optimization, and specify the chip size.

How to fix/remove selection filters and specify the chip size

You can make a selection from the filter list on the right side of the Circuit Pattern column where the circuits are displayed.

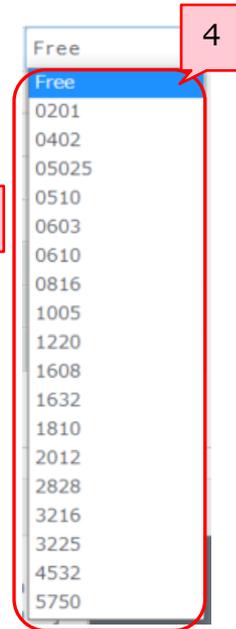
Make a selection from the [Status] and [Size] pull-down menus under [Optimize Setup] in the table.

	P/N	Optimize Setup	
		Status	Size
1	Select -	Optim. ▼	▼
2	Select -	Optim. ▼	▼
3	Select -	Optim. ▼	Free ▼
4	Select ▼	Optim. ▼	Free ▼
5	Select -	Optim. ▼	Free ▼
6	Select ▼	Optim. ▼	Free ▼
7	Select -	None ▼	▼
8	Select -	None ▼	▼



How to operate	
1	Three menus appear in the pull-down menu. Menu
2	Optim.: Displays optimized items Fix: Fix None: No filter

	P/N	Optimize Setup	
		Status	Size
1	Select -	Optim. ▼	Free ▼
2	Select -	Optim. ▼	Free ▼
3	Select -	Optim. ▼	Free ▼
4	Select ▼	Optim. ▼	Free ▼
5	Select -	Optim. ▼	Free ▼
6	Select ▼	Optim. ▼	Free ▼
7	Select -	None ▼	▼
8	Select -	None ▼	▼



How to operate	
3	Multiple size options appear in the pull-down menu. Menu
4	Free. : Displays user-set items Non-Free: Locked to items of a specified size.

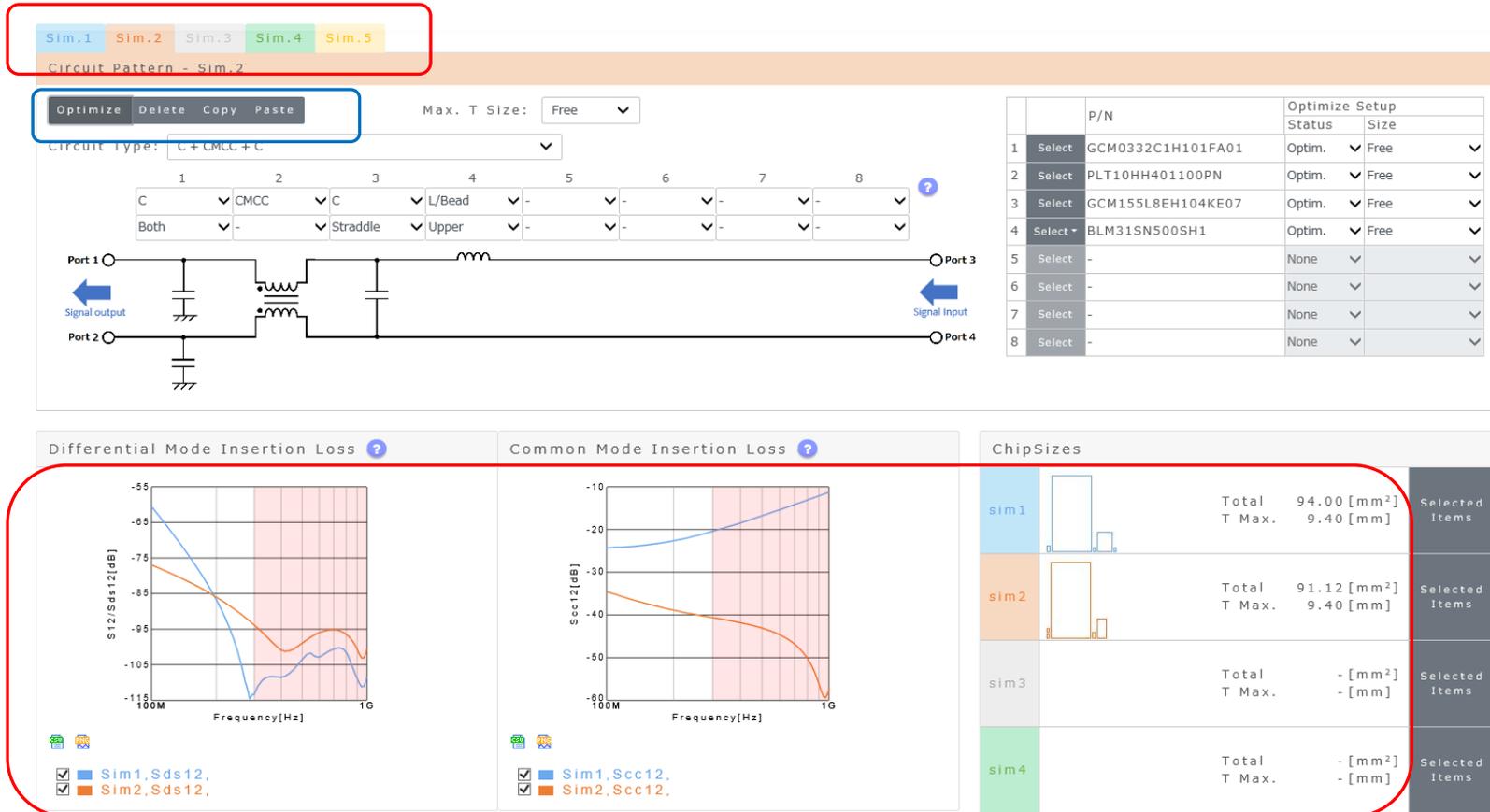
3. Advanced Features

3-4. You can compare multiple circuit configurations.

How to compare multiple circuit conditions

You can compare multiple conditions using the Sim tab.

If conditions are present on multiple tabs, the insertion loss graph and mounting area results are automatically displayed.



The screenshot displays the simulation software interface. At the top, there are five simulation tabs: Sim.1, Sim.2, Sim.3, Sim.4, and Sim.5. Below the tabs, there are buttons for 'Optimize', 'Delete', 'Copy', and 'Paste'. The circuit diagram shows a differential mode circuit with components labeled 1 through 8. Below the diagram are two graphs: 'Differential Mode Insertion Loss' and 'Common Mode Insertion Loss'. The 'Differential Mode Insertion Loss' graph shows S12/Sds12 [dB] vs Frequency [Hz] for Sim1 and Sim2. The 'Common Mode Insertion Loss' graph shows Scc12 [dB] vs Frequency [Hz] for Sim1 and Sim2. To the right, there is a table for 'Chip Sizes' comparing Sim1, Sim2, Sim3, and Sim4.

	P/N	Optimize Status	Setup Size
1	Select GCM0332C1H101FA01	Optim.	Free
2	Select PLT10HH401100PN	Optim.	Free
3	Select GCM155L8EH104KE07	Optim.	Free
4	Select BLM31SN500SH1	Optim.	Free
5	Select -	None	
6	Select -	None	
7	Select -	None	
8	Select -	None	

sim	Total	T Max.	Selected Items
sim1	94.00 [mm ²]	9.40 [mm]	Selected Items
sim2	91.12 [mm ²]	9.40 [mm]	Selected Items
sim3	- [mm ²]	- [mm]	Selected Items
sim4	- [mm ²]	- [mm]	Selected Items

Use the [Delete], [Copy], and [Paste] buttons next to [Optimize].

3. Advanced Features

3-5. You can output data.

How to output data

The numerical data CSV output and graph image output buttons can be found at the lower left of insertion loss.

You can output the results by clicking these buttons.

