

Power inductor selection tool

– Operation Manual –

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Overview, Operating environment, Installation method

Overview

This tool is used to refer degrees of inductor loss on power inductors of TAIYO YUDEN. Also, this tool is used as a guideline to select a low-loss inductor.

Operating environment

OS: Windows 7 or later

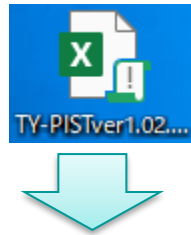
MS Excel: Excel2010-2016

Installation method

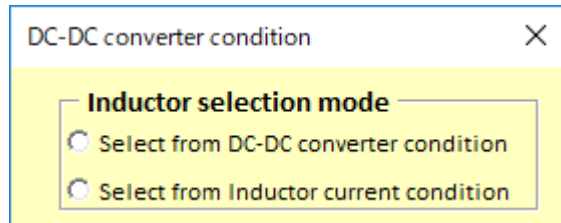
This tool does not require installation. Please download "PowerInductorSelectionTool.zip" from the website of TAIYO YUDEN. After extracting it, the MS Excel file of "PowerInductorSelectionToolVer**.xlms" appears. You can use the power inductor selection tool with launching the file. When a lineup of power inductors of TAIYO YUDEN is added, the version of this tool will be updated. Please always download and use the latest version.

Operation method: Overview

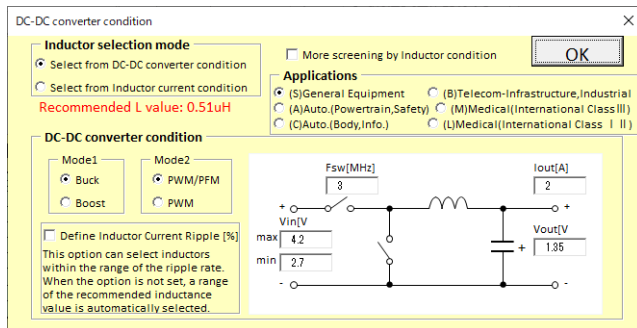
1. Launch the downloaded MS Excel file.



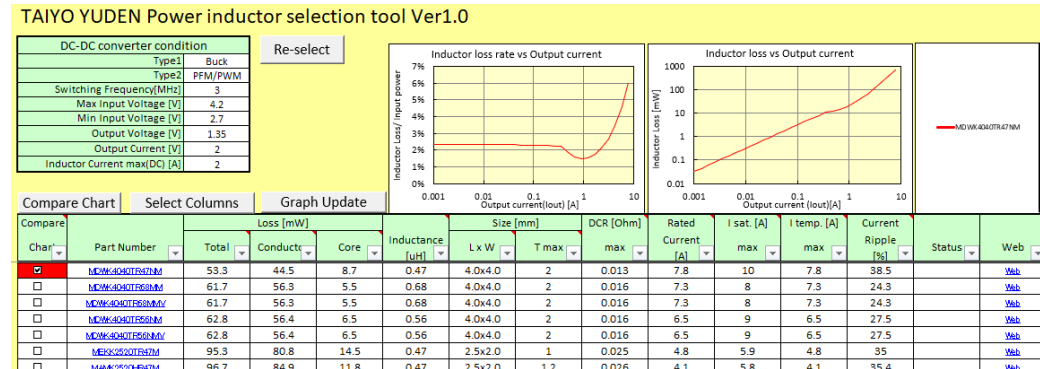
2. Select the "selection mode".
"DC-DC converter" or "inductor current"



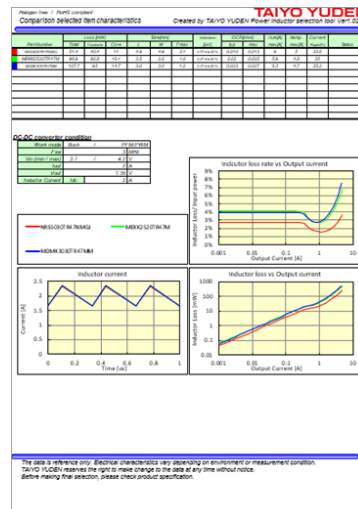
3. Set the detailed conditions.



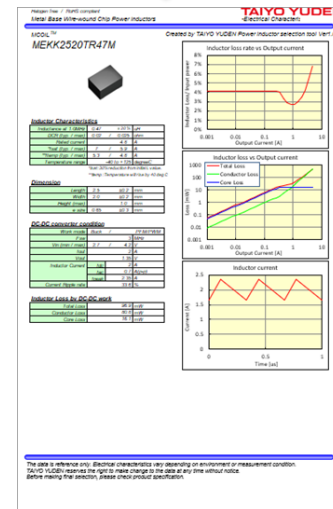
4. The selection result appears.



5. Further operations enable to show the comparison result, detailed information, and web page.



Comparison result



Detailed information



Web page

Operation method: Selection condition input (DC-DC converter)

DC-DC converter condition

1 **Inductor selection mode**
☒ Select from DC-DC converter condition
☐ Select from Inductor current condition

Recommended L value: 0.51uH

2 **DC-DC converter condition**
Mode1: ☒ Buck, ☐ Boost
Mode2: ☒ PWM/PFM, ☐ PWM

5 ☐ Define Inductor Current Ripple [%]
This option can select inductors within the range of the ripple rate. When the option is not set, a range of the recommended inductance value is automatically selected.

6 ☐ More screening by Inductor condition

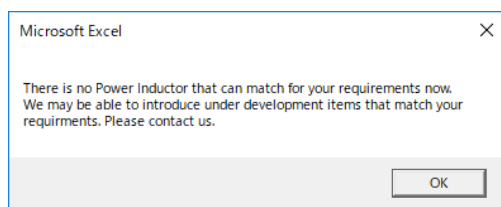
7 **Applications**
☒ (S)General Equipment
☐ (A)Auto.(Powertrain,Safety)
☐ (C)Auto.(Body,Info.)
☐ (B)Telecom-Infrastructure,Industrial
☐ (M)Medical(International Class III)
☐ (L)Medical(International Class I II)

3 **Circuit Diagram:**
Fsw[MHz]: 3
Iout[A]: 2
Vin[V]: max 4.2, min 2.7
Vout[V]: 1.35

4 **OK**

Based on the selection conditions, the L value that makes the ripple rate of the inductor current into 30% will be shown as a recommended value. Other inductors, which have almost the same as the recommended L value, are also shown.

Any ripple current rate can be set with the procedure 5.



If there is no inductor applicable to the selection conditions, the message left side appears. Please contact TAIYO YUDEN CO., LTD.

Required settings

1. Click the upper radio button to select "DC-DC converter condition".

2. Select an option in "Mode 1" and "Mode 2".

3. Input the conditions such as I/O voltage and frequency of the DC-DC converter.

4. After completion of all inputs, click "OK" button to output the selection result.

Optional settings

5. Set the ripple current range.

6. Candidates of power inductor are selected by the spec. (Please refer to Page 7.)

7. Select the usage environment of the equipment.

Operation method: Selection condition input (Inductor current waveform)

DC-DC converter condition

1 **Inductor selection mode**

☐ Select from DC-DC converter condition

☒ Select from Inductor current condition

☐ More screening by Inductor condition

5 OK

2 PWM PFM

Inductor current condition 3(PWM)

$I_{p-p}[A]$ 0.3

$I_{dc}[A]$ 1

$F_{sw}[MHz]$ 3

I

t

Required settings

1. Click the lower radio button to select "inductor current condition".

2. Select a waveform mode, PWM or PFM, by tabs.

3. PWM mode:

Set I_{p-p} , I_{dc} , and frequency as waveform conditions.

3. PFM mode:

Set I_{p-p} , I_{dc} , pulse frequency (F_p), and cycle frequency (F_c) as waveform conditions.

PWM PFM

Inductor current condition 3(PFM)

4 **Input Mode**

☒ Freq.

☐ Time

$I_{p-p}[A]$ 0.3

$T_p=1/F_p$

$T_c=1/F_c$

$F_p[MHz]$ 3

$F_c[MHz]$ 1.5

I

t

4. When the radio button of "Time" in the "Input Mode" box is clicked, F_p and F_c can be set by time base, T_p and T_c .

5. After completion of all inputs, depress "OK" button to output the selection result.

Operation method: Selection condition input (Inductor condition)

DC-DC converter condition

Inductor selection mode

☒ Select from DC-DC converter condition

☐ Select from Inductor current condition

Recommended L value: 0.51uH

DC-DC converter condition

Mode1: ☒ Buck ☐ Boost

Mode2: ☒ PWM/PFM ☐ PWM

☐ Define Inductor Current Ripple [%]

This option can select inductors within the range of the ripple rate. When the option is not set, a range of the recommended inductance value is automatically selected.

Applications

☒ (S)General Equipment ☐ (B)Telecom-Infrastructure,Industrial

☐ (A)Auto.(Powertrain,Safety) ☐ (M)Medical(International Class III)

☐ (C)Auto.(Body,Info.) ☐ (L)Medical(International Class I II)

Inductor Condition

Inductance[uH]: 0.35, 0.36, 0.43, 0.45, 0.47, 0.5, 0.51

Size L x W [mm]: 1.0x0.5, 1.25x1.05, 1.4x1.2, 1.64x1.64, 1.6x0.8, 2.0x1.2, 2.0x1.25

Size T max[mm]: 0.5, 0.55, 0.6, 0.65, 0.8, 0.95

Several conditions can be selected.

3

I sat max [A] min max

I temp max [A] min max

DCR max [Ohm] min max

Please define min or max or both value.

2

1

More screening by Inductor condition

OK

Diagram: A schematic of a DC-DC converter. It shows an input voltage Vin[V] with a range from 4.2V (max) to 2.7V (min). The input is connected to a switch controlled by Fsw[MHz] (set to 3). The switch is in series with an inductor. The output of the inductor is connected to a capacitor and then to the output terminals. The output current Iout[A] is set to 2. The output voltage Vout[V] is 1.35V.

Optional settings

1. When the box is checked, the input fields of "Inductor Condition" appear at the bottom of the window.

2. Select the "inductance", "Size L x W", and "Size T max" from the lists to screen applicable inductors.

* When "DC-DC converter condition" is selected and the box of "Define Inductor Current Ripple [%]" is not checked, inductors having near the recommended inductance value are automatically selected.

3. To narrow down suitable inductors, set the ranges of "I sat max [A]", "I temp max [A]", and "DCR max [Ohm]".

* If 2 and/or 3 are not set, the suitable inductors are not narrowed.

Selection list output

1 DC-DC converter condition

Type1	Buck
Type2	PFM/PWM
Switching Frequency[MHz]	3
Max Input Voltage [V]	4.2
Min Input Voltage [V]	2.7
Output Voltage [V]	1.35
Output Current [V]	2
Inductor Current max(DC) [A]	2

Applications: General Equipment

7 Re-select

2

Inductor loss rate vs Output current

Inductor loss vs Output current

4 Graph Update

5 Select Columns

3

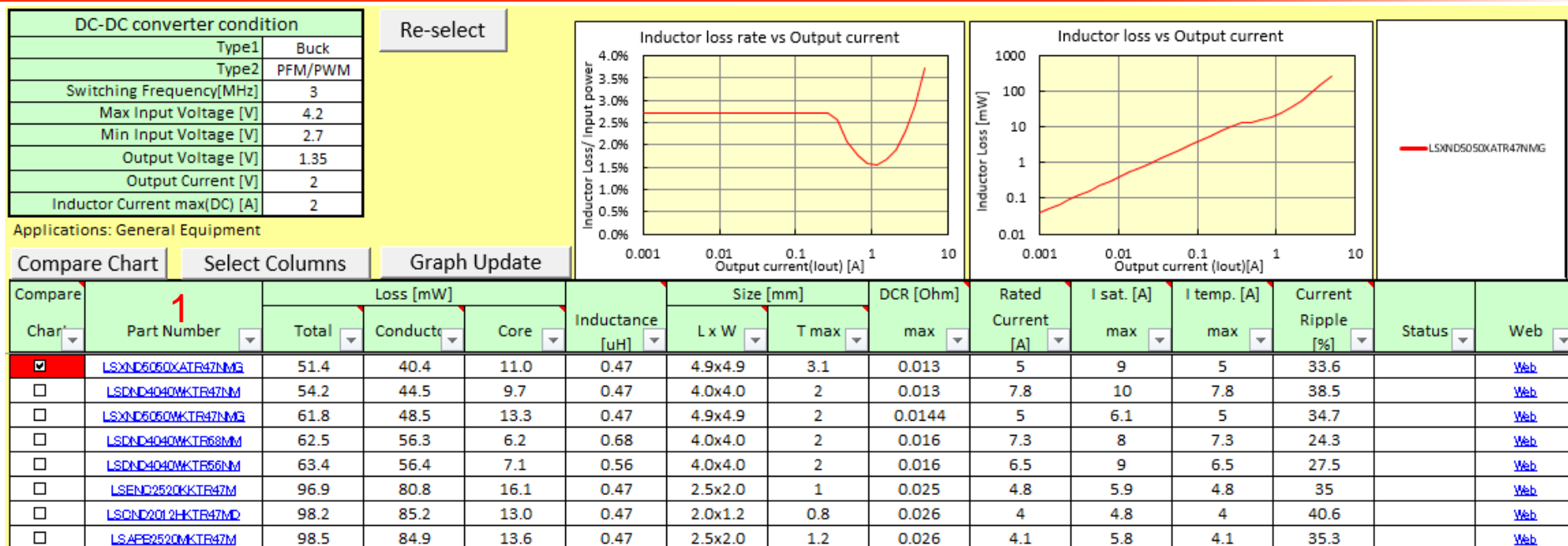
Compare	Part Number	Loss [mW]			Inductance [uH]	Size [mm]		DCR [Ohm]	Rated Current [A]	I sat. [A]	I temp. [A]	Current Ripple [%]	Status	Web
		Total	Conductor	Core		L x W	T max							
<input checked="" type="checkbox"/>	LSXND5050XATR47NMG	51.4	40.4	11.0	0.47	4.9x4.9	3.1	0.013	5	9	5	33.6		Web
<input type="checkbox"/>	LSDND4040WKT847NM	54.2	44.5	9.7	0.47	4.0x4.0	2	0.013	7.8	10	7.8	38.5		Web
<input type="checkbox"/>	LSXND5050WKT847NMG	61.8	48.5	13.3	0.47	4.9x4.9	2	0.0144	5	6.1	5	34.7		Web
<input type="checkbox"/>	LSDND4040WKT868NM	62.5	56.3	6.2	0.68	4.0x4.0	2	0.016	7.3	8	7.3	24.3		Web
<input type="checkbox"/>	LSDND4040WKT856NM	63.4	56.4	7.1	0.56	4.0x4.0	2	0.016	6.5	9	6.5	27.5		Web
<input type="checkbox"/>	LSENC2520KKT847M	96.9	80.8	16.1	0.47	2.5x2.0	1	0.025	4.8	5.9	4.8	35		Web
<input type="checkbox"/>	LSDND2012HKTR47MD	98.2	85.2	13.0	0.47	2.0x1.2	0.8	0.026	4	4.8	4	40.6		Web
<input type="checkbox"/>	LSAPB2520MKT847M	98.5	84.9	13.6	0.47	2.5x2.0	1.2	0.026	4.1	5.8	4.1	35.3		Web

If there are suitable inductors, they are displayed in increasing order of inductor loss (Total Loss), the 3rd column from the left side.

1. The select condition is displayed.
2. Charts (X axis: Iout) of "Inductor loss rate vs Output current" and "Inductor loss vs Output current" are displayed. *
3. When a box is checked, a power inductor to be compared is selected (maximum 10).
4. The chart of the power inductor, which was selected in 3 above, is reflected to 2. *
5. Items in the list can be changed.
6. Clicking "Web" in the row of the selected power inductor enables to see detail information.
7. Click the "Re-select" button when searching with other conditions.

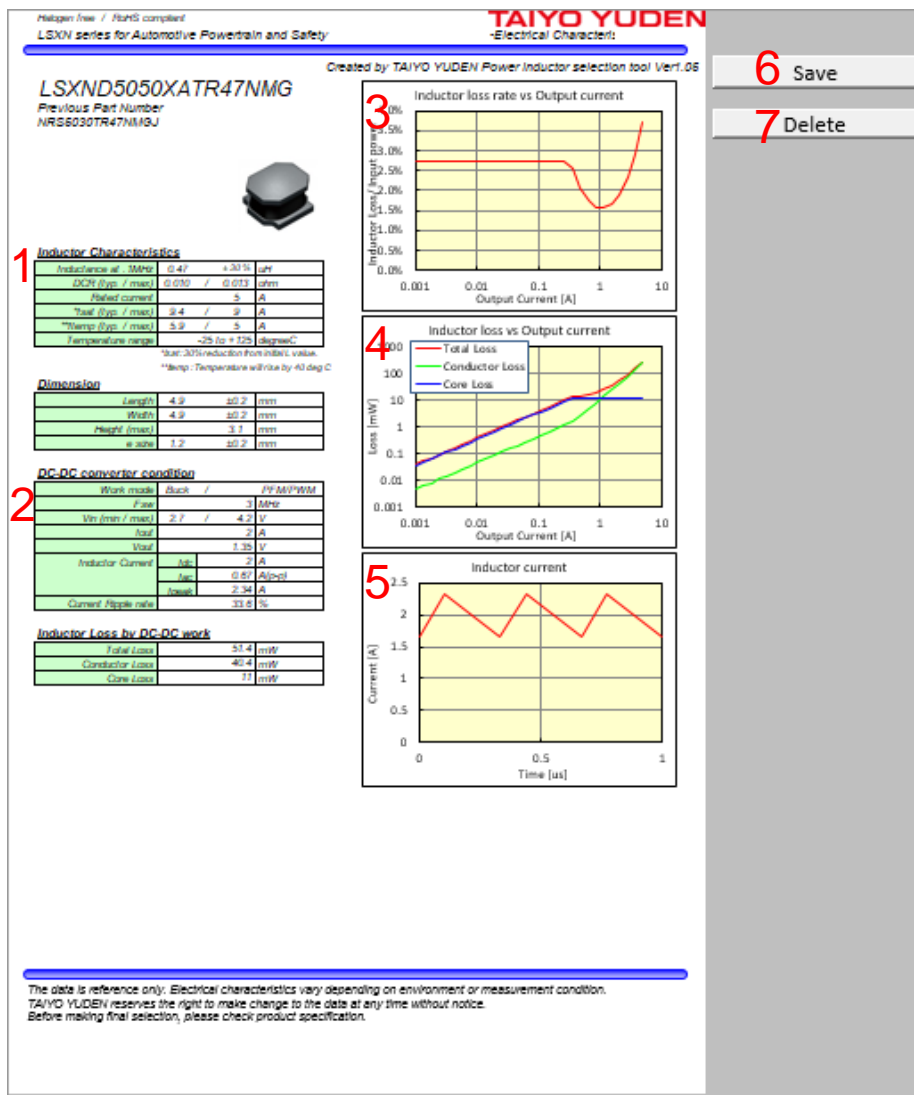
* The procedures 2 & 4 are not displayed when "inductor current condition" mode is selected.

Detail result output



1. Clicking "Part Number", which you want to check, enables to see detail information of the power inductor.

Detail result output

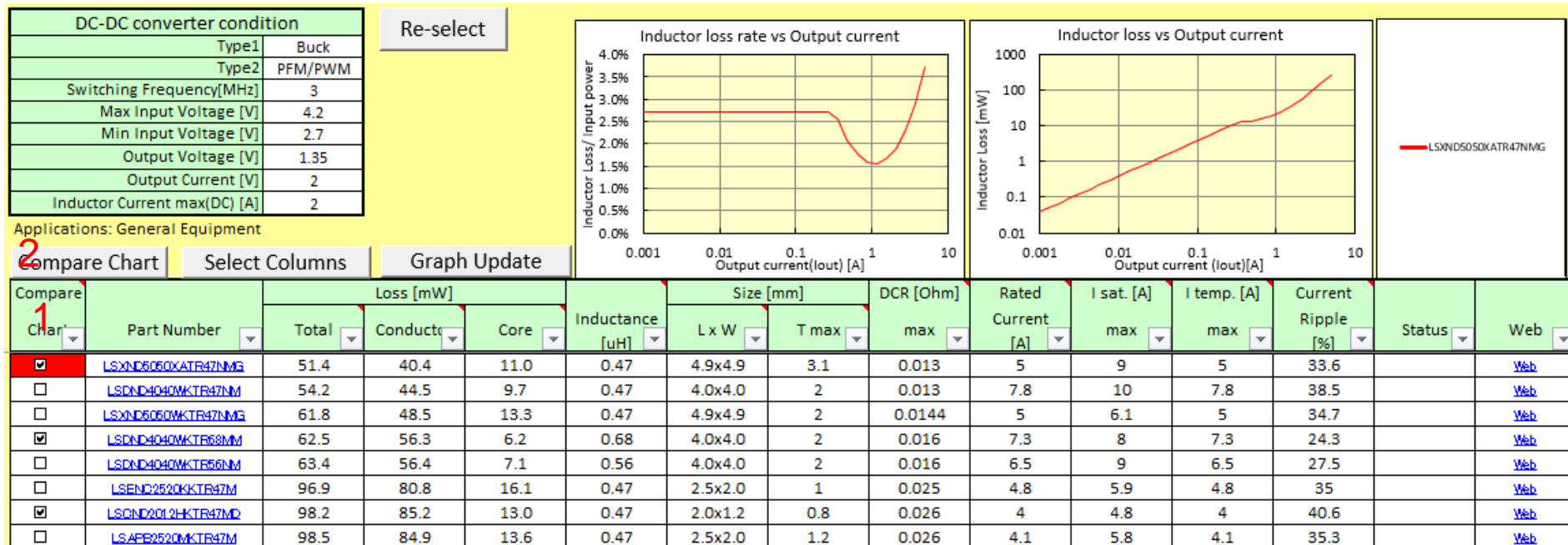


1. "Inductor Characteristics" and "Dimension" tables are displayed.
2. "DC-DC converter condition" and "Inductor Loss by DC-DC work" are displayed. *
3. "Inductor loss rate vs Output current" chart (X axis: I_{out}) is displayed. *
4. "Inductor loss vs Output current" chart (Total Loss, Conductor Loss, Core Loss; X axis: I_{out}) is displayed. *
5. The inductor current waveform is displayed.
6. Clicking "Save" button enables to save this sheet.
7. The sheet can be deleted with clicking "Delete" button.

The sheet can be printed regardless "Save" or not.

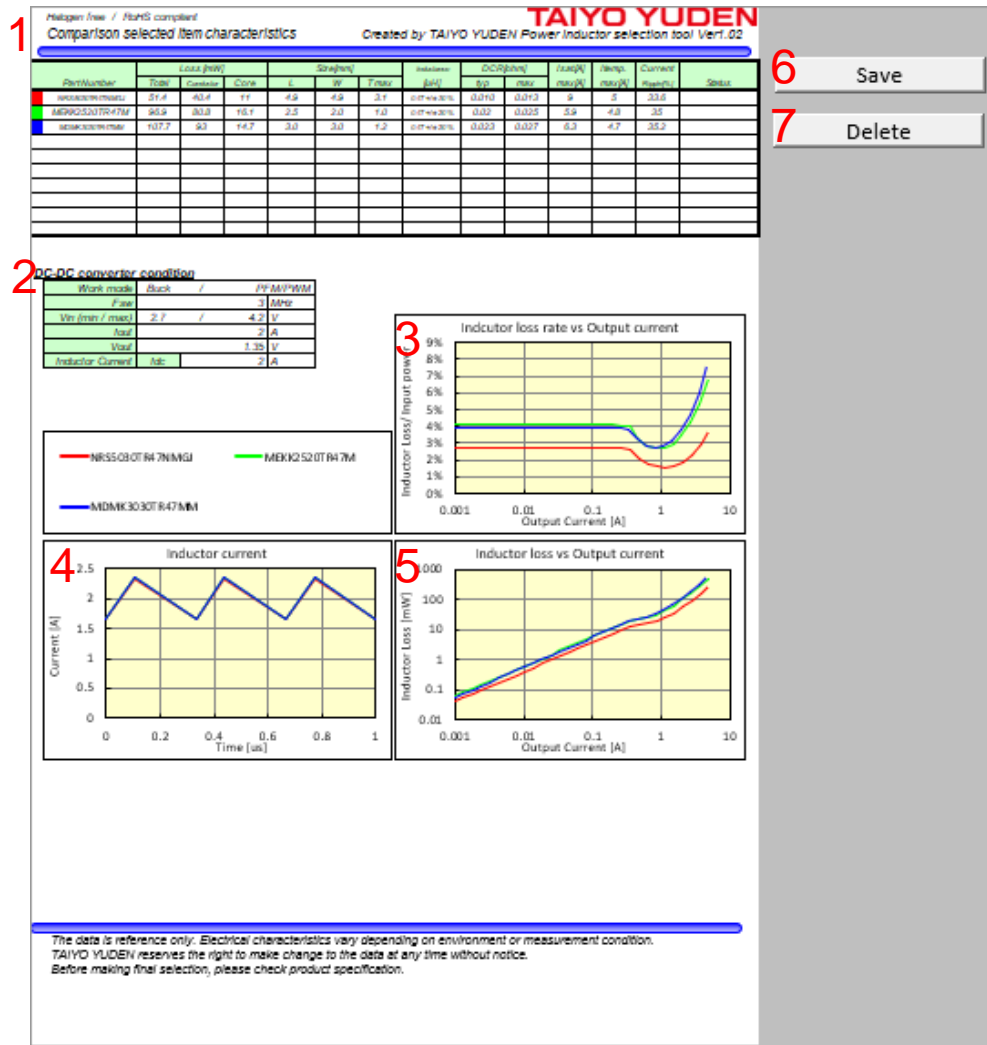
* The procedures 2 (partial), 3, and 4 are not displayed when "inductor current condition" mode is selected.

Comparison result output



1. When a box is checked, a power inductor to be compared is selected (maximum 10).
2. After the selection, clicking "Compare Chart" tab enables to create a new sheet displaying the comparison results.

Comparison result output



1. Part Number, Loss, Size, etc. are displayed.
2. "DC-DC converter condition" is displayed. *
3. "Inductor loss rate vs Output current" chart (X axis: Iout) is displayed. *
4. "Inductor loss vs Input voltage" chart (X axis: Vin) is displayed. *
5. "Inductor loss vs Output current" chart (X axis: Iout) is displayed. *
6. Clicking "Save" button enables to save this sheet.
7. The sheet can be deleted with clicking "Delete" button.

The sheet can be printed regardless "Save" or not.
* The procedures 2 (partial), 3, 4, and 5 are not displayed when "inductor current condition" mode is selected.

Termination handling

When operations are finished, click "X" (close) on the right side upper of the window.

"Selection list output", "Detail result output", and "Comparison result output" are not saved like usual Excel file.

* When resume a file after finished, the file returns back to the initial condition. If you want to save them, save or print the file with referring the procedures in page 10 and 12.

TAIYO YUDEN