

POWER LOSS SIMULATION Ver.5.0.0

User's Manual

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1 Introduction

1.1 Feature of Mitsubishi Power Module Loss Simulator

This software is the power loss simulation for inverter system named "Melcosin".

1.2 Hardware Requirements

 (1) OS Microsoft® Windows® XP Professional(32bit) or Microsoft® Windows® Windows7 Professional(32bit, 64bit)

(2) HDD 50MB or more (except Microsoft[®] .NET Framework).

(3) Memory 500MB or more

(4) Library Microsoft .NET Framework3.5 or later

1.3 Definition

This document is explained for operation of the Mitsubishi Power Module Loss Simulator "Melcosim" for 2Level inverter and 3-Level inverter.

* Windows is a registered trademark of Microsoft Corporation in the United States and other countries. Mitsubishi Power Module Loss Simulator is a Microsoft .NET Framework-based application

1.4 Install

1.4.1 Decompression

Download from the Mitsubishi Electric Homepage and decompress "Melcosim for 3 Level Installer.zip" into some folder.

- There are below three files in this ZIP file
- Melcosim Ver.5 Installer.msi
- Readme.txt
- setup.exe



1.4.2 Setup

Execute "setup.exe".

Click [Next >] Button
Welcosim Ver.5
Welcome to the Melcosim Ver.5 Setup Wizard

The installer will guide you through the steps required to install Melcosim Ver.5 on your computer.

WARNING: This computer program is protected by copyright law and international treaties.
Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.

Cancel

Cancel

Agent

Change Install folder, if necessary. (Default folder is made under "Program Files". Select account and click [Next>] Button



Click [Next>] Button for installing.

岃 Melcosim Ver.5	- • ×
Confirm Installation	E
The installer is ready to install Melcosim Ver.5 on your computer.	
Click "Next" to start the installation.	
Cancel < <u>B</u> ack	<u>N</u> ext >

Installing...

😸 Melcosim Ver.5			- • ×
Installing Melcosim Ver	.5		
Melcosim Ver.5 is being installed.			
Please wait			
	Cancel	< <u>B</u> ac	< <u>N</u> ext >

Click [Close] Button to End.

B Melcosim Ver.5	
Installation Complete	
Melcosim Ver.5 has been successfully installed.	
Click "Close" to exit.	
Please use Windows Update to check for any critical updates to the .NET Fram	ework.
Cancel (<u>B</u> ack	Close

Short-cut Icon will be generated on the Desktop after install.

Recycle Bin

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Melcosim Ver.5	
 Default Programs Desktop Gadget Gallery Internet Explorer Windows DVD Maker Windows Fax and Scan Windows Media Center Windows Media Player Windows Update XPS Viewer Accessories Games Maintenance Melcosim Ver.5 Melcosim Ver.5 Melcosim Ver.5 Startup 	Test Documents Pictures Music Computer Control Panel Devices and Printers Default Programs Help and Support
Back Search programs and files	Shut down 🕨

1.5 Uninstall

Click "Programs and Features" in the "Control Panel". Select "Melcosim Ver.5" and then click "Uninstall"

Control Rand a	All Control Pag	el Benne & Decorange and Cestures	-	Securit Per	aname and Sea		
Control Panel Home	Uninsta	Il or change a program	- Sich Universit Change of Parati	7	grono ene rea		_
😵 Tum Windows features on or off	Organize •	Uninstall Change Repair	Bablatar	64440	6	(ii) ▼	0
	Name Melcosim V	lar5	Publisher Mitsubishi Electric Corporation	2013/04/08	5120 7.17 MB	1.0.0	
		litsubishi Electric Corporation Product v	rersion: 1.0.0 Co Size: 7.17 MB	mments: Melco	osim Ver.5 Instal	ler	,

Select "Yes", then it will start uninstall.

Programs and Features	
Are you sure you want to uninstall Melcosin	n Ver.5?
In the future, do not show me this dialog box	Yes No

After uninstall, confirm to erase " Melcosim Ver.5".

2 Description of the Windows

2.1 Setup Language

This software can select from six languages by using "PowerLossSimLangSetting.exe".

2.1.1 Languages

Following languages are available.

- English (Default)
- Japanese
- German
- Chinese
- Spanish
- Portuguese

2.1.2 Select Language

Click "Melcosim Ver.5 Setup Language" in the Start Menu for executing "PowerLossSimLangSetting.exe".

Powerlosssim Setting Language	X
Language	
 English 	○ Deutsch
○□★哥	о ф у
◇□平間	ΨX
C Español	○ Português
Setting Language	Close

Click the radio button for select language.

-Landuade	ing Language
 English 	O Deutsch
◎ 日本語 ○ Español	A setup of language was completed. Please restart powerlosssim.
Setting Lar	Iguage Ciose

Click [OK] button of the dialog box and click [Close] button of the ""PowerLossSimLangSetting.exe".

2.1.3 Language Selecting Timing

For selecting language, setup language program "PowerLossSimLangSetting.exe" can be executed regardless of running "Melcosim" or not running. Start up "Melcosim" after setup language, language will be set up. Setup language can be select language any number of times.

2.2 Main Window

This is the main window of the simulator, it can be confirmed User Guide and Software version information.



(1) [2 Level New Design]

New 2 Level simulation (refer to 2.4).

- (2) [3 Level New Design] New 3 Level simulation (refer to 2.5).
- (3) [Open the English User Guide] Access to the English User's Manual.
- (4) [Open the Japanese User Guide] Access to the Japanese User's Manual

(5) [About Melcosim]

Confirm version of this software and data (refer to 2.3).

(6) [Design1]

Read latest stored calculation conditions. Include 2 Level conditions and 3 Level conditions.

(7) [Design2]

Read second latest stored calculation conditions.

(8) [Design3]

Read third latest stored calculation conditions.

(9) [Open]

Open other stored calculation conditions from selecting window.

(10) [Close]

Exit simulator (Close all windows).

2.3 Version

Confirming of the program version and data file version. (1)



2.4 Power Loss Simulation (2 Level)

2.4.1 2Level Select Topology Window

Window for selecting topology.



(1) [Open] (Ctrl + O)

Open stored calculation conditions from selecting window.

(2) [Save] (Ctrl + S)

Save calculation conditions.

(3) [Save As](Ctrl + A)

Save calculation conditions as a new file.

(4) [Stage]TAB

Select Windows

(It is necessary to click [NEXT>>] button for setting the change of topology selection before moving to the "Device & Condition Input" TAB)

(*1) Selected algorithm is emphasized.

(5) [Topology]Radio Button

Click the radio button for select calculation topology.

(6) [Selected Topology]Area

Show the selected topology and schematic.

(7) [Comment]

Comment for this window.

(8) [NEXT]Button (Ctrl + N)

Set a selected topology and jump to the "Device & Conditions Input" TAB (refer to 2.4.2).

2.4.2 2Level Device & Conditions Input Window



Select Power Modules and Input parameters for calculation.

(1) [Open] (Ctrl + O)

Open stored calculation conditions from selecting window.

(2) [Save] (Ctrl + S)

Save calculation conditions.

(3) [Save As](Ctrl + A)

Save calculation conditions as a new file.

(4) [Stage]TAB

Select Window.

(5) [Select Module]

Open a selection window (refer to 2.4.3).

(6) [Link to Data sheet]

Download the datasheet of the selected module from WEB site. (need to internet connection).

(7) [Keep Conditions] Check Box

Fix the Common conditions in checking this box. (Prohibit from overwriting the common conditions when re-selecting a module.)

(8) [Common Conditions] Set common conditions

(9) [Tr1 Conditions] - [Tr2 Conditions]

Set Gate resistances Gate resistances of Tr2 to Tr6 are same as Tr1 in Sinusoidal current topology.

Gate resistances of Tr3, 5 and Tr 4, 6 are same as Tr1 and Tr2 respectively in 6 Steps topology and select 1in1 module.

Default data are Inputted after selecting module. These are invalid for IPM.

(10) [Comment]

Comment for this window.

(11) [EXECUTE] (Ctrl + E)

Execute calculation and jump to [Result] TAB (refer to 2.4.4) with generating [Graph] TAB (refer to 2.4.5).

2.4.3 Module Selecting Window



(1) [x] (ESC)

Close this window without module selection.

(2) [Series]

Module selection thru Module Series (Left Window)

(3) [Current/Voltage]

Module selection thru Current/Voltage ratings (Right Window)

At select [Series]

(4) [Division]

Select Division

(5) [Series]

Select Series

(6) [Module]

Select target module

At select [Current/Voltage]

(7) [Current Min]

Choose or input minimum value of Current rating. (*1)

(8) [Current Max]

Choose or input maximum value of Current rating. (*1)

(9) [Voltage Min]

Choose or input minimum value of Voltage rating. (*1)

(10) [Voltage Max]

Choose or input maximum value of Voltage rating. (*1)

(11) [Module]

Select target module.

(12) [OK]

Fix the target module.

*1: Module types in (11) are limited by each input.

2.4.4 2Level Result Window

Calculation results are shown in this window with calculation conditions.



(1) [Open] (Ctrl + O)

Open stored calculation conditions from selecting window.

(2) [Save] (Ctrl + S)

Save calculation conditions.

(3) [Save As](Ctrl + A)

Save calculation conditions as a new file.

(4) [Stage]TAB

Select Window.

(5) [Transistor (IGBT/MOSFET)] TAB

Simulation result for each Transistor. Display the result for each Transistor by selecting TAB.

(6)[Diode] TAB

Simulation result for each Diode Display the result for each Diode by selecting TAB.

(7)[Save Result to CSV]

Save calculation result in "CSV" format.

2.4.5 2Level Graph Window

Several graphs of the calculation result can be shown in this window.



(1) [Open] (Ctrl + O)

Open stored calculation conditions from selecting window.

(2) [Save] (Ctrl + S)

Save calculation conditions.

(3) [Save As](Ctrl + A) Save calculation conditions as a new file.

(4) [Stage]TAB

Select Window.

(5)[Graph Type] List Box

- Select graph type
- 1: Current Angle
- 2: Power Loss Time
- 3: Power Loss Current
- 4: Current (max) fc
- 5: Temperature (ave.) Current 6: Temperature ripple - Time
- 7: Temperature Pice (ave 8 m
- 7: Temperature Rise (ave.& max.) Current 8: Io(A), P(W) - Time
- 9: Io(A), P(W) Angle
- 10: Tc(max) Current

(6) [Set Range]

Set MIN and MAX of x-Axis, y-Axis and y2(right)-Axis. Manual zooming by Click and Drag on the graph are available.

(7) [RESET]

Reset range setting and zooming.

(8) [Add Device]

Add or remove elemental devices for the graph. (refer to 2.4.6)

(9) [Copy to Clipboard]

Copy the graph to clipboard in "PNG" format.

(10) [Save to Image file]

Save the graph in "PNG" format.

(11) [Save Graph to CSV file]

Save graph data in "CSV" format.

(12) [Expand Graph Area]

Click this area and move scroll bar for expanding graph width. Maximize window and expand graph width is recommended for getting better graph.

2.4.6 Add device



(1) [×] (ESC)

Cancel selecting devices.

(2) [Add]

Add elemental devices from the Device List.

(3) [Remove]

Remove elemental devices from the Selected Devices.

(4) [Current]

With Io waveform for confirm phase angle.

(5) [OK]

Fix drawing elemental devices.

2.5 Power Loss Simulation (3 Level)

2.5.1 3Level Select Topology



(1) [Open] (Ctrl + O)

Open stored calculation conditions from selecting window.

(2) [Save] (Ctrl + S)

Save calculation conditions.

(3) [Save As](Ctrl + A)

Save calculation conditions as a new file.

(4) [Stage]TAB

Select Windows

(It is necessary to click [NEXT>>] button for setting the change of topology selection before moving to the "Device & Condition Input" TAB)

(5) [Topology] Radio button

Click the radio button or schematic area for select calculation topology

(6) [Schematic]

Click the radio button or schematic area for select calculation topology. (*1)

(7) [Comment]

Comment for this window.

(8) [NEXT>>] (Ctrl + N)

Set a selected topology and jump to the "Device & Conditions Input" TAB. (refer to 2.5.2)

(*1) Selected circuit name and schematic displays are emphasized.

2.5.2 3Level Device & Conditions Input Window

Select Mitsubishi Power Modules and Input parameters for calculation



(1) [Open] (Ctrl + O)

Open stored calculation conditions from selecting window.

(2) [Save] (Ctrl + S)

Save calculation conditions.

(3) [Save As](Ctrl + A)

Save calculation conditions as a new file.

(4) [Stage]TAB

Select Window.

(5) [Select Module]

Open a selection window (refer to 2.5.3)

(6) [Link to Data sheet]

Download the datasheet of the selected module from WEB site. (need to internet connection).

(7) [Keep Conditions] Check Box

Fix the Common conditions in checking this box. (Prohibit from overwriting the common conditions when re-selecting a module.)

(8) [Common Conditions] Set common conditions

(9) [Tr1 Conditions] – [Tr4 Conditions]

Set Gate resistances Gate resistances of Tr3 and Tr4 are same as Tr2 and Tr1 respectively. Default data are Inputted after selecting Tr1 module.

(10) [Comment]

Comment for this window.

(11) [EXECUTE] (Ctrl + E)

Execute calculation and jump to [Result] TAB (refer to 2.5.4). with generating [Graph] TAB (refer to 2.5.5)

2.5.3 Module Selecting Window



(1) [x] (ESC)

Close this window without module selection.

(2) [Series]

Module selection thru Module Series (Left Window)

(3) [Current/Voltage]

Module selection thru Current/Voltage ratings (Right Window)

At select [Series]

(4) [Division]

Select Division

(5) [Series]

Select Series

(6) [Module]

Select target module

At select [Current/Voltage]

(7) [Current Min]

Choose or input minimum value of Current rating. (*1)

(8) [Current Max]

Choose or input maximum value of Current rating. (*1)

(9) [Voltage Min]

Choose or input minimum value of Voltage rating. (*1)

(10) [Voltage Max]

Choose or input maximum value of Voltage rating. (*1)

(11) [Module]

Select target module.

(12) [OK]

Fix the target module.

*1: Module types in (11) are limited by each input.

2.5.4 3Level Result Window

Calculation results are shown in this window with calculation conditions.



(1) [Open] (Ctrl + O)

Open stored calculation conditions from selecting window.

(2) [Save] (Ctrl + S)

Save calculation conditions.

(3) [Save As](Ctrl + A)

Save calculation conditions as a new file.

(4) [Stage]TAB

Select Window.

(5) [Transistor (IGBT/MOSFET)] TAB

Simulation result for each Transistor. Display the result for each Transistor by selecting TAB.

(6)[Diode] TAB

Simulation result for each Diode Display the result for each Diode by selecting TAB.

(7)[Save Result to CSV]

Save calculation result in "CSV" format.

2.5.5 3Level Graph Window

Several graphs of the calculation result can be shown in this window.



(1) [Open] (Ctrl + O)

Open stored calculation conditions from selecting window.

(2) [Save] (Ctrl + S)

Save calculation conditions.

(3) [Save As](Ctrl + A) Save calculation conditions as a new file.

(4) [Stage]TAB

Select Window.

(5)[Graph Type] List Box

- Select graph type
- 1: Current Angle
- 2: Power Loss Time
- 3: Power Loss Current
- 4: Current (max) fc
- 5: Temperature (ave.) Current 6: Temperature ripple - Time
- 7: Temperature Rise (ave.& max.) Current 8: Io(A), P(W) - Time
- 9: Io(A), P(W) Angle
- 10: Tc(max) Current

(6) [Set Range]

Set MIN and MAX of x-Axis, y-Axis and v2(right)-Axis. Manual zooming by Click and Drag on the graph are available.

(7) [RESET]

Reset range setting and zooming.

(8) [Add Device]

Add or remove elemental devices for the graph. (refer to 2.5.6)

(9) [Copy to Clipboard]

Copy the graph to clipboard in "PNG" format.

(10) [Save to Image file]

Save the graph in "PNG" format.

(11) [Save Graph to CSV file]

Save graph data in "CSV" format.

(12) [Expand Graph Area]

Click this area and move scroll bar for expanding graph width. Maximize window and expand graph width is recommended for getting better graph.

2.5.6 Add device

(1) Select adding or removing elemental devices. (2)-(3) Select Device Device List Selected Devices Tr1 Tr1 Tr2 Tr2 Tr3 Di1 Di2 Tr4 Add >> Di1 Di5 Di2 << Remove Di3 Di4 Di5 Di6 🗹 Current OK (4)- (5)

(1) [×] (ESC)

Cancel selecting devices.

(2) [Add]

Add elemental devices from the Device List.

(3) [Remove]

Remove elemental devices from the Selected Devices.

(4) [Current]

With Io waveform for confirm phase angle.

(5) [OK]

Fix drawing elemental devices.

3 Procedure for Sinusoidal (3Phase) Calculation

Select "2 Phase" radio button in 3.2.2 for 2 phase modulation. Other procedure same as 3 phase modulation.

3.1 Application Start-up

When the software starts up, a message window pops-up showing validity date.



Click OK, then move to the main window in the case that the experiation date is valid.

lew Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
3 Level New Design	Design3
Open the English User Guide	🗃 Open
Open the Japanese User Guide	

3.2 New Design Calculation

3.2.1 Main Window

Click [2 Level New Design] button.

ew Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
3 Level New Design	Design3
Open the English User Guide	Open
Open the Japanese User Guide	

3.2.2 Select Topology Window

Click radio button for selecting "Sinusoidal" and click [NEXT>>] button.

🖾 Design1 - Melcosim Ver.5.0.0	
Select Topology Device & Conditions Input	
Sinusoidal Current Sinusoidal 2 Phase 	(32) ¹⁰⁰ Xa 50
6 Steps High-side Chopping First Half Chopping	
 Chopper Down / Motor Lock Boost 	
	Full Bridge and Half Bridge also avaliable
Select kind of circuit and topology.	
	NEXT >>

3.2.3 Device & Conditions Input Window

Design1 - Melcastm Ver5.0.0	-		
2 🖬 🗣			
Select Topology Device & Conditions Input			
Sinusoidal	Common Conditio	ns	
English Data Sheet	Keep Condition	ns	
> 100 Japanese Data Sheet	Vec	v	
	lo	Apeak Arms	
	PF		
£ 0 3	м		
	Fc	kHz	
	Fo	Hz	
	Тя	v	
	Tj max	°C	
	Tr1 Conditions		
	Rg(on)	Ω	
Ч Ч Ч I	Rg(off)	Ω	
· · · · · · · · · · · · · · · · · · ·			
Select modules and input conditions. PF=coso			
M=Modulation Ratio			
		EXECUT	'E>>
	Module	Select	
mmon Conditions are set automatically when selecting	۲	Series 🔘 Current/Voltage	
wer module.		Division: IGBT_MOD	
		Series: NX-Series	
		Module: IGBT MOD: CM450E	X-24A
		OK	

Select a module, set common conditions and gate resistances.

After selecting all devices and set conditions, click [EXECUTE>>] button. NOTE) In case of no-selection device or no data in conditions, [EXECUTE>>] button is not available.

Sinusoidal		Common Cond	itions		_
	English Data Sheet	🗏 Keep Condi	tions		
- 100	Japanese Data Sheet	Vec	600	v	
		lo	225	@ Apeak	
		PF	0.8		
ž 0		м	1		
· · · · · · · · · · · · · · · · · · ·		Fc	5	kHz	
	CM460DX-24A	Fo	60	Hz	
TL -	EH _3P	Ts	90	°c	
		Tj max	125	°C	
		Tr1 Conditions			
		Ra(on)	0.68	Ω	
		Rg(off)	0.68	0	
· · · · · ·		- Starth			

3.2.4 Result Window



A few second later, result window will be opened automatically with calculation results.

3.2.5 Graph Window

Calculation results can be shown visually in the graph window.



Calculation conditions will be saved by using [Save] or [Save As] buttons at upper left Save without result).



Saving graph by [Copy to Clipboard] or [Save to Image file] button and text data by [Save to CSV file] button.



eg.) It is available to open CSV file of text data and then paste PNG data of graph.

Maximize window and expand graph width is recommended for getting better graph.

3.3 Open Previous Design

3.3.1 Open the Latest Saved Design

ew Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
3 Level New Design	Design3
Open the English User Guide	Open
Open the Japanese User Guide	

Saved in Design1, Design2 and Design3 for three recent designs. Include 2 Level conditions and 3 Level conditions.

3.3.2 Open the Saved Design in Folders

2 Level New Design	Design1
2 A averal Many Decision	Design2
3 Level New Design	Design3
Open the English User Guide	Open

4 **Procedure for Chopper (Down/Motor Lock, Boost)**

4.1 Application Start-up

When the software starts up, a message window pops-up showing validity date.



Click OK , then move to the main window in the case that the experiation date is valid.

lew Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
3 Level New Design	Design3
Open the English User Guide	产 Open
Open the Japanese User Guide	

4.2 New Design Calculation

4.2.1 Main Window

Click [2 Level New Design] button.

lew Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
3 Level New Design	Design3
Open the English User Guide	Dpen
Open the English User Guide	Open

4.2.2 Select Topology Window

Click radio button for selecting "Down/Motor Lock" or "Boost" and click [NEXT>>] button. Shown "Down/Motor Lock" topology in this description.

Design3 - Melcosim Ver.5.0.0	
Select Topology Device & Conditions Input	
Clause lidel Company	
Sinusoidai Current	
Sinusoidal	
@ 2 Phase	
0 11111	
	DI
6 Steps	
High-side Chopping	¥ ***
First Half Chopping	
Chopper	
Down / Motor Lock	
© Boost	· · · · · · · · · · · · · · · · · · ·
Select kind of circuit and topology.	
	NEXT >>

4.2.3 Device & Conditions Input Window

🗮 Design2 - Melcosim Ver.5.0.0			
Select Topology Device & Conditions Input			
Down / Motor Lock	Common Conditions		
English Data Sheet	Keep Conditions		
Japanese Data Sheet	Vi V		
Select Device	Vo V		
	lo A		
	li + A		
	FC K	Hz	
	Duty -		
	Ts Y		
	Tjmax 1		
	Tr1 Conditions		
	Rg(on) G	2	
	Rg(off)	2	
	X		
Select modules and input conditions. PF=cosp			
M=Modulation Ratio			
		EXECUTE >>	
	Module Select		×
Common Conditions are set automatically when selecting	Series	Current/Voltage	
power module	Division:	IGBT_MOD	•
	Sorios	NV Series	
	Series.	IN-SELIES	_
	Module:	IGBT_MOD: CM450DX-24A	•
		UK	

Select a module, set common conditions and gate resistances.

Design3 - Melcosim Ver.5.0.0 Select Topology Device & Conditions Input Down / Motor Lock English Data Sheet Japanese Data Sheet CM450DX-24A English Data Sheet The select Topology Device & Conditions Input CM450DX-24A English Data Sheet The select Topology The select Topology Down / Motor Lock	Common Con Keep Cond Vi Vo Io Ii Fc Duty Ts Tj max Tr1 Condition Rg(on) Rg(off)	ditions ditions 600 600 225 225.00 5 1.00000 90 125 s 0.68 0.68	V V A A KHz ℃ ℃			×
Select modules and input conditions. PF=cosφ M=Modulation Ratio				EXI	ECUTE >>	

After selecting all devices and set conditions, click [EXECUTE>>] button. NOTE) In case of no-selection device or no data in conditions, [EXECUTE>>] button is not available.

😂 Design3 - Melcosim Ver.5.0.0					X
Select Topology Device & Conditions Input					
Down / Motor Lock	Common Con	ditions			
English Data Sheet	Keep Cond	litions			
JP Japanese Data Sheet	Vi	600	v		
CM450DX-24A	Vo	600	v		
et as	lo	225	Α		
	li	225.00	Α		
	Fc	5	kHz		
Tri'	Duty	1.00000			
	Ts	90	°C		
	Tj max	125	°C		
······	Tr1 Condition	s			
	Rg(on)	0.68	Ω		
°	Rg(off)	0.68	Ω		
	5. 7				
Select modules and input conditions. PF=coso					
M=Modulation Ratio					
				EXECUTE >>	- I

	Common Conditions Keep Conditions Vi V V Vo V Io A Ii - A Fc Module Select Duty Ts Series @ Current/Voltage
	Tj max Current: 1200 • A ~ 2400 • A Tr1 Condit Voltage: • V ~ • V Rg(on) Rg(off) Module: HVIGBT_MOD: CM1500HC-66R • OK
Select modules and input conditions. PF=cosφ M=Modulation Ratio	EXECUTE >>

Show up [Select Device] button for FRDi in case on selecting 1in1module for Transistor.



4.2.4 Result Window

A few second later, result window will be opened automatically with calculation results.



4.2.5 Graph Window

Calculation results can be shown visually in the graph window.



Calculation conditions will be saved by using [Save] or [Save As] buttons at upper left Save without result).



Saving graph by [Copy to Clipboard] or [Save to Image file] button and text data by [Save to CSV file] button.





4.3 Open Previous Design

4.3.1 Open the Latest Saved Design

Welcosini	Ver.5.0.0
lew Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
3 Level New Design	Design3
Open the English User Guide	Dpen
Open the Japanese User Guide	

Saved in Design1, Design2 and Design3 for three recent designs. Include 2 Level conditions and 3 Level conditions.

4.3.2 Open the Saved Design in Folders

New Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
3 Level New Design	Design3
Open the English User Guide	Dpen
Open the Japanese User Guide	

5 **Procedure for I Type NPC Calculation**

5.1 Application Start-up

When the software starts up, a message window pops-up showing validity date.



Click OK , then move to the main window in the case that the experiation date is valid.

ew Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
Z 3 Level New Design	Design3
Open the English User Guide	🔁 Open
Open the Japanese User Guide	

5.2 New Design Calculation

5.2.1 Main Window

Click [3Level New Design] button.

lew Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
3 Level New Design	Design3
Open the English User Guide	Open
Open the Japanese User Guide	

5.2.2 Select Topology Window

Click radio button or schematic area for selecting "I Type NPC (1)" or "I Type NPC (2)" and click [NEXT>>] button.



Select " I Type NPC(2)" for applying 2 in1 or chopper module.

5.2.3 Device & Conditions Input Window

😂 Design1 - Melcosim Ver.5.0.0 - - -P Select Topology Device & Conditions Input I Type NPC (1) common Conditions Keep Conditions CI English Data Sheet Japanese Data Sheet ٧ Vcc lo Arms PF Select Device Μ kHz Fc Select Device Hz t-2 Fo Tf °C •0 Tj max Tr1 Conditions Ω Rg(on) Rg(off) Ω 2 Conditions Rg(on) Ω Select modules and input conditions. PF = cos ϕ M = Modulation Ratio EXECUTE >> Current/Voltage Series Division: IGBT_MOD . NX-Series Common Conditions are set automatically when selecting high side IGBT_MOD: CM450DX-24A . Mod ule: power module. ок

Select a module and set common conditions and gate resistances.

Select Topology Device & Condi	tions Input		- Common Cond	itions	
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	The Fredlink Date Observe	Keep Condi	tions	1
		IN English Data Sheet	Nee Vee	4000 \	
			VCC	1200 V	
	9		lo	200 Arm	5
		CM400HA 24A	PF	0.8	
			М	1	1
			Fc	5 kHz	
Select Device		CM400HA-24A	Fo	60 Hz	
	• • • • • • • • • • • • • • • • • • • •	EN JP	Tf	90 °C	
		CM400HA-24A	Tj max	125 °C	_
			Tr1 Conditions		
	Tr4 Di4	CM400HA-24A	Rg(on)	0.78 Ω	
	·}i		Rg(off)	0.78 Ω	
			Tr2 Conditions		
			Rg(on)	0.78 Ω	
Select modules and input condition PF = cosφ M = Modulation Ratio	s.				

After selecting all devices and set conditions, click [EXECUTE>>] button. NOTE) In case of no-selection device or no data in conditions, [EXECUTE>>] button is not available.

Eesign1 - Melcosim Ver.5.0.0				
Select Topology Device & Conditions Input				
I Type NPC (1)		Common Conditi	ons	· ·
	English Data Sheet	Keep Condition	ons	
	JP Japanese Data Sheet	Vcc	1200 V	
		lo	200 Arms	
		PF	0.8	
101 *	CM400HA-24A	M	1	=
	EN JP	Fc	5 kHz	
CM400HA-24A 712 T	CM400HA-24A	Fo	60 Hz	
	-0	Tf	90 °C	
CM400HA-24A	CM400HA-24A	Tj max	125 °C	
				. · · · ·
nal Ina	CM400HA-24A	Tr1 Conditions		1
- Tt.		Rg(on)	0.78 Ω	
		Rg(off)	0.78 Ω	
		Tr2 Conditions		
		Rg(on)	0.78 Ω	-
Select modules and input conditions. PF = cosp M = Modulation Ratio				
				EXECUTE >>

5.2.4 Result Window

A few second later, result window will be opened automatically with calculation results.



5.2.5 Graph Window

Calculation results can be shown visually in the graph window.



Calculation conditions will be saved by using [Save] or [Save As] buttons at upper left.



Saving graph by [Copy to Clipboard] or [Save to Image file] button and text data by [Save to CSV file] button.

91	77-11(E)	MERIE) 1	R#00 M	10 800	2) 9-HU	7-90	0 2125	200 01	(708)					鋼助を入	カレモください	Л		×
	a la la		0 - 1 7 -	at Lanes						-	-			GER 1 + A 1 1771	- Are Are	-	Bill-rubation)	1.0
-		x1.4.1		The second							-		a pri de las	(H) (N) (H)			a second (2)	- (B) • - 2
-	1211	*					-	H	1	1	P.						0	
	Prescion	= Time	0		-	F		n	Barrent	The Time	R	-		PS.		P		н
0	Concentrally	orition							Power D	ass - mere				_				
8	Vec	1200						100		112	- Number							
4	lo.	500						200		100	- Dr Prester							
5	P#	08						200		12 .	DOProston DOProvense							
6	м	1						8	2 1 1 1	12 1								
T	Fo	5						0 E	001 000	TEz &		0						
в	Fo	60						100		12 *								
6	Τc	90						100	IN IN	12								
0	Trüendkier	n							1811	ME								
1	Name	hT	T n2	Tr3	Tr4					14								
2	Rgian)	0.47	0.47	0.47	0.47				Time(ma)									
3	Røam	0.47	0.47	0.47	0.47			0		0		0						
4	Result																	
5_	Output Gu	TRITE	Trl Poven	rices.	Tr2 Powerf	111	Dil Povert	bas	DE Powerl	0.00	D5 Power	tons .						
đ	Time(ms)	Current(A)	Time(ms)	P(W)	Time[rss]	P[W]	Time(me)	P(W)	Time(ms)	P(W)	Time(ras)	P[W]						
7	0.023148	-419.311	0.023148		0.023148	. (0.023148	694,7197	0.023148	694 71 97	0.023148		0					
8	0.069444	-409.311	0.069444		0.069444	(0.069444	693.3773	0.069444	683 3773	0.009444		0					
9	0115741	-398.185	0.115741		0.115741	(0115741	691,2319	0.115741	681 2319	0.115741		0					
٥.	0162037	-388.938	0.162037		0.162087	0	0162037	688.1877	0.162037	688 2577	0.162087		0					
1	0.208333	-378.573	0.206333	0	0.208333	0	0.208333	684.5508	0.206333	6845508	0.2083333		0					
1	025463	-318.092	0:25463		0.25463		025463	680.0285	0:25463	680.0285	0.25463		0					
<u>a</u> _	0.300926	-357,499	0.300826		0.300926		0.300926	674.7299	0.300825	674,7299	0.300926		0					
4	0.347222	-346.793	0.347222		0.347222	(0.347222	669.6653	0.347222	668 6653	0.347222		0					
٤.,	0.353519	-335.99	0.393519		0.393519		0.350519	661 B465	0.395519	661 8466	0.393519		0					
ā.	0.439815	-325.081	0.430615	0	0.439815	0	0.439815	654,2872	0.430615	654,2872	0.439515		0					
7	0.486111	-314.072	0.496111		0.489111	(0.486111	649.0017	0.496111	646.0017	0.489111		0					
3	0.532407	-302.967	0.532407		0.532407		0532407	637.0061	0.532407	637.0061	0.532407		0					
9	0578704	-291.771	0.578704		0.578704		0.578704	627.3177	0.578704	627.3177	0.578704		0					
2	0.625	-280.485	0.625		0.625	0	0.625	016.965	0.625	616.555	0.625		0					
	0.671295	-200.114	0.671296	0	0.671296	0	0.571295	605.9377	0.671296	605 9377	0.671296		0					
2	0.717593	-257.661	0.717593		0.717593	(0.717593	594 2867	0.717593	594/2867	0.717593		0		-			
4	P H OLDA	t/200.000	0.345000				0.100000	PO1 0003	0.940000	FD0 0000	- and	e	0		10			

eg.) It is available to open CSV file of text data and then paste PNG data of graph.

Maximize window and expand graph width is recommended for getting better graph.

5.3 Open Previous Design

5.3.1 Open the Latest Saved Design

Melcosim Ver.5.0.0	
Melcosim V	/er.5.0.0
New Design	Recently Opened Designs
2 Level New Design	Design1
3 Lovel New Design	Design2
S Level New Design	Design3
Open the English User Guide	Open
Open the Japanese User Guide	
About Melcosim	Close

Saved in Design1, Design2 and Design3 for three recent designs. Include 2 Level conditions and 3 Level conditions.

5.3.2 Open the Saved Design in Folders

Melcosim	Ver.5.0.0
New Design	Recently Opened Designs
2 Level New Design	Design1
3 Level New Design	Design2
Open the English User Guide	Open
Open the Japanese User Guide	
About Melcosim	Close

6 **Procedure for T Type NPC Calculation**

6.1 Application Start-up

When the software starts up, a message window pops-up showing validity date.



Click OK , then move to the main window in the case that the experiation date is valid.

lew Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
3 Level New Design	Design3
Open the English User Guide	Open
Open the Japanese User Guide	

6.2 New Design Calculation

6.2.1 Main Window

Click [3 Level New Design] button.

Vew Design	Recently Opened Designs
2 Level New Design	Design1
- Di suri Mari Dastan	Design2
3 Level New Design	Design3
Open the English User Guide	🚅 Open
Open the Japanese User Guide	

6.2.2 Select Topology Window

Click radio button of[T Type (AC switch) NPC] or schematic area and click [NEXT>>] button.



6.2.3 Device & Conditions Input Window

Select a module and set common conditions and gate resistances.



T type (AC switch) N	IPC III English Data Sheet J2 Japanese Data Sheet CM400HA-24A III JP CM400HA-24A	Common Cond Vec Io PF M Fc Fo Tf Tj max Tr1 Conditions Rg(on) Rg(off)	itions tions 600 V 200 Arms 0.8 1 5 kHz 60 Hz 90 ℃ 125 ℃ 125 ℃	
		Tr2 Conditions		

After selecting all devices and set conditions, click [EXECUTE>>] button. NOTE) In case of no-selection device or no data in conditions, [EXECUTE>>] button is not available.

Select Topology	Device & Conditions Input						
	T type (AC sw	itch) NPC	Common Conditions				
		EN English Data Sheet	🖂 Keep (
		Japanese Data Sheet	Vcc lo	1000	V		
				600	Arms		
		PF	0.8				
	CM1000DUC-34NF	M Fc	1				
	EH JP		5	kHz			
			Fo	60	Hz		
	Tra Tra		Tf	90	*C		
	CM400HA-24A		Tr1 Condi	tions			
	·····		Rg(on)	0.78	Ω		
			Rg(off)	0.78	Ω		
		Tr2 Conditions					
				. =.	-		
elect modules an F = cosφ	d input conditions.						

6.2.4 Result Window

A few second later, result window will be opened automatically with calculation results.



6.2.5 Graph Window

Calculation results can be shown visually in the graph window.



Calculation conditions will be saved by using [Save] or [Save As] buttons at upper left.



Saving graph by [Copy to Clipboard] or [Save to Image file] button and text data by [Save to CSV file] button.

21	OF DAL	Martin	0 - 1	at 1 100%		H (-	- 10		100 dd 144	SEE 1 + 4 1 1221 -	A .A .	2012/00/07	(in) helion (in)	1.
	ni Lik	A 4		the second									Pri de las			100 (D) 🗳	a matter (E)	- B) -
Line	4		0				6	н	1	, d	K		м	N	0	P	0	D
Pow	er Los	= Time	~				-		Preser La	Time.	6	-			~	-		
Cow	in the second se	orition						-	FORM D	ARE - HERE								
100		1200						100	0 0	112	- Contraction							
		500						200		18 :	- Di Postini							
ar.		0.8						200		12 .	DOProston DOProston							
A.		1						8	2 1 1	12 1								
2		5						5 E	01 (01)	122		0						
5		60						100	11/21	15								
0		90						100		12								
rD:	ondition	1							1811	ME								
łan	10	Trl	T 12	T/3	Tr4			1		14								
ad o	n)	0.47	0.47	0.47	0.47				Timegeng)									
80	m	0.47	0.47	0.47	0.47					0		0						
10.01	uk																	
Jut	put Cur	THET	Trl Pover	loss .	Tr2 Powerk	188	Dil Poveri	bez	DE Power	0.00	D5 Powerl	DEE						
ine	(ara)	Current(A)	Time(ms)	P(W)	Time(rss)	PIWI	Time(ms)	P\$W0	Time(ms)	P(W)	Time(rss)	PIW1						
0.0	23148	-419.311	0.023148	0	0.023148	(0.023148	694.T197	0.023148	694,7197	0.023148		0					
0.0	69444	-409.311	0.069444	0	0.069444	(0.069444	693,3773	0.069444	683 3773	0.069444		0					
0.1	15741	-398.185	0.115741	0	0.115741	(0115741	691 2319	0.115741	661 2319	0.115741		0					
01	62037	-388.938	0.162037	0	0.162087	0	0162037	688 1877	0.162037	688 2577	0.162087		0					
0.2	08333	-378.573	0.206333	0	0.2083333	0	0.208333	684.5508	0.206333	6845508	0.2083333		0					
0	25463	-308.092	0:25463	0	0.25463		025463	680.0285	0:25463	680.0285	0.25463		0					
0.3	00926	-357,499	0.300825	0	0.300926	(0.300926	674.7299	0.300825	674.7299	0.300926		0					
03	47222	-346.793	0.347222	0	0.347222	(0.347222	669.6653	0.347222	668 6653	0.347222		0					
0.3	03519	-335.99	0.395519	0	0.393519	0	0.353519	661 B465	0.393519	661 8466	0.393519		0					
0.4	39815	-325.081	0.430615	0	0.439815	0	0.439815	654 2872	0.430615	654,2872	0.439515		0					
0.4	86111	-314.072	0.496111	0	0.489111	(0.486111	646.0017	0.496111	646 0017	0.485111		0					
05	32407	-302.967	0.532407	0	0.532407		0532407	637.0061	0.532407	637.0061	0.532407		0				-	
0.5	78704	-291.771	0578704	0	0.578704	(0578704	627.3177	0.578704	627.3177	0.578704		0					
	0.625	-280.485	0.625	0	0.625	0	0.625	616.955	0.625	616.555	0.625		0					
0.5	T1295	-200.114	0.671296	0	0.671296	0	0.671295	605 9377	0.671296	605 9377	0.671296		0					
07	17593	-257.601	0.717593	0	0.717593	(0.717593	594 2967	0.717583	594,2867	0.717593		0				-	
H	outou	1 assiste	0.345000		0.563300.			Pag 00014	0.945000	* Do . 00004	- and		0					

eg.) It is available to open CSV file of text data and then paste PNG data of graph.

Maximize window and expand graph width is recommended for getting better graph.

6.3 Open Previous Design

6.3.1 Open the Latest Saved Design

Melcosim Ver.5.0.0	
Melcosim \	/er.5.0.0
New Design	Recently Opened Designs
2 Level New Design	Design1
2 Level New Desire	Design2
3 Level New Design	Design3
Open the English User Guide	Open
Open the Japanese User Guide	
About Melcosim	Close

Saved in Design1, Design2 and Design3 for three recent designs. Include 2 Level conditions and 3 Level conditions.

6.3.2 Open the Saved Design in Folders

Melcosim Ver.5.0.0	
Melcosim	Ver.5.0.0
New Design	Recently Opened Designs
2 Level New Design	Design1
	Design2
3 Level New Design	Design3
Open the English User Guide	Open
Open the Japanese User Guide	
About Melcosim	Close

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