IPOSIM

The Infineon Power Simulation program for loss and thermal calculation of Infineon Power Modules and Disk Devices

Step by Step Guide (April 2015)

www.infineon.com/Infineon-IPOSIM

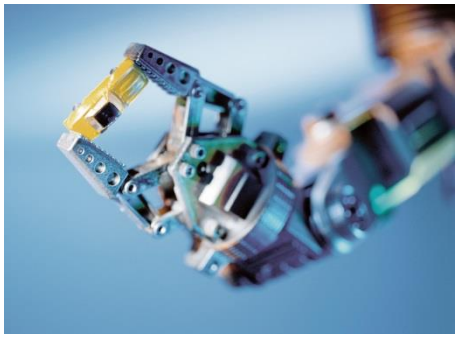
What is the benefit of IPOSIM?

- IPOSIM is an easy to use yet sophisticated online simulation tool for loss and thermal calculation of Infineon Power Modules and Disk Devices. Just copy-paste the following link to your browser (Internet Explorer, Chrome, Firefox, etc.) and get started: www.infineon.com/Infineon-IPOSIM

- IPOSIM helps you to select the right Infineon bipolar modules or disk devices for your rectifier (B2, B6, M3.2 and M6) or AC switch (W1C and W3C) applications as well as suited IGBT modules for your inverter (single & three phase in 2-Level as well as 3-Level) or DC converter (buck and boost) applications.

- IPOSIM performs a calculation of switching and conduction losses for all components, taking into account conduction and switching characteristics as well as thermal ratings. Where applicable, different control algorithms can be applied.

- Thermal conditions can be adapted by user defined or predefined heat sinks. Beside single operation points complete load cycles may be calculated. Results will be shown in tabular and graphic representation and can be saved for later revision or printed as .pdf file



Registration: Welcome to IPOSIM

1. Start the application with: www.infineon.com/Infineon-IPOSIM
2. If not yet done, please registrate in order we can inform you when the simulation is finished

Login

Email

Password

Forgot password? Login

Register for Free

Email

Password

Confirm Password

First Name

Last Name

Company

Phone

United States of America

General Opt-In *
I agree that my personal data maintained above can be gathered, processed and used for sales promotion as market research by Infineon Technologies AG and its licensed distribution partners.

Privacy Policy *
I have read the privacy policy and agree with it.

I agree to terms of use *

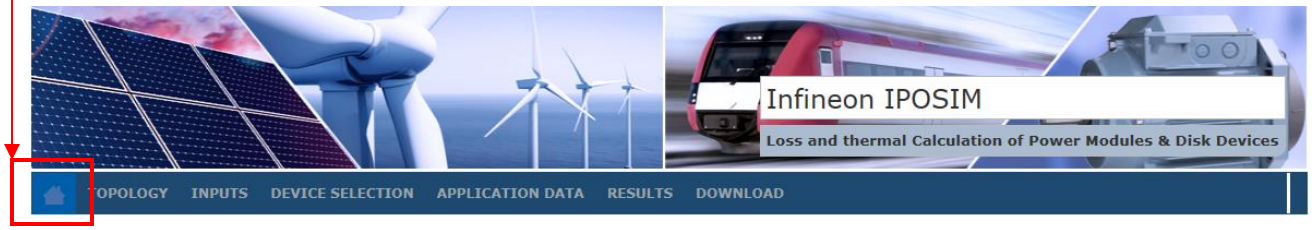
Register

WebSIM© technology - sophisticated online design and support solutions for semiconductor and other products. For more information please visit www.transim.com

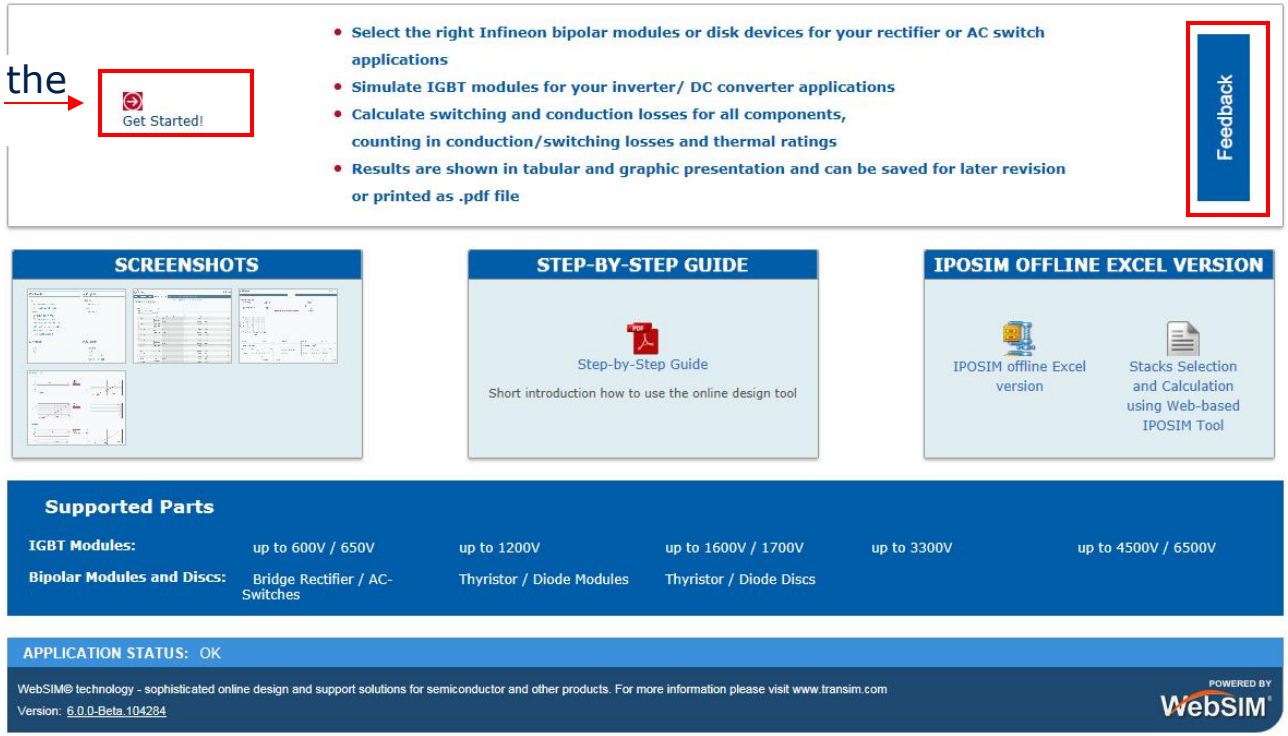
WebSIM

Home: Getting Started

1. Click on the home screen button to open this Step-by-Step Guide or to learn more about the tool



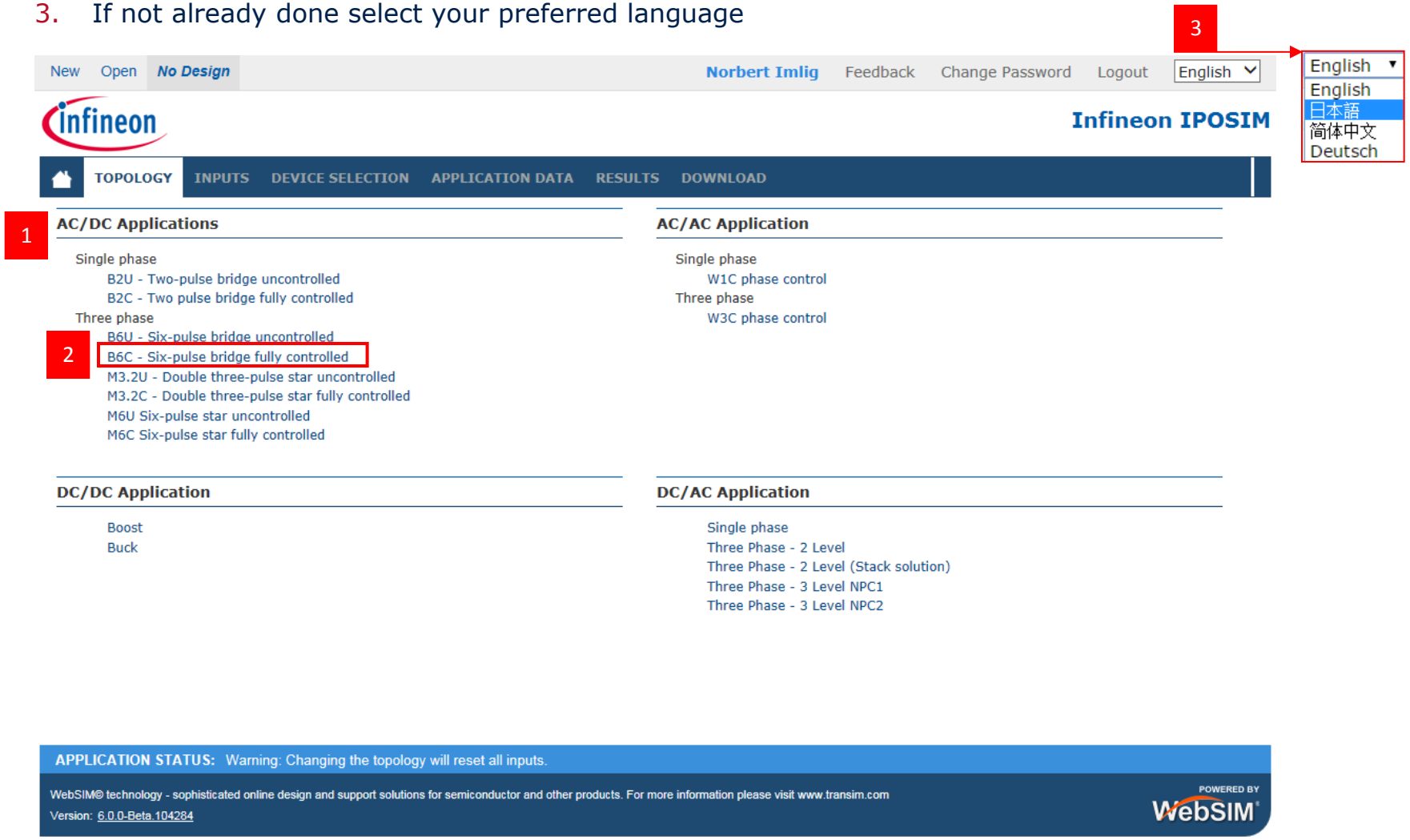
2. Start the tool



3. Please Feed-back if you need help

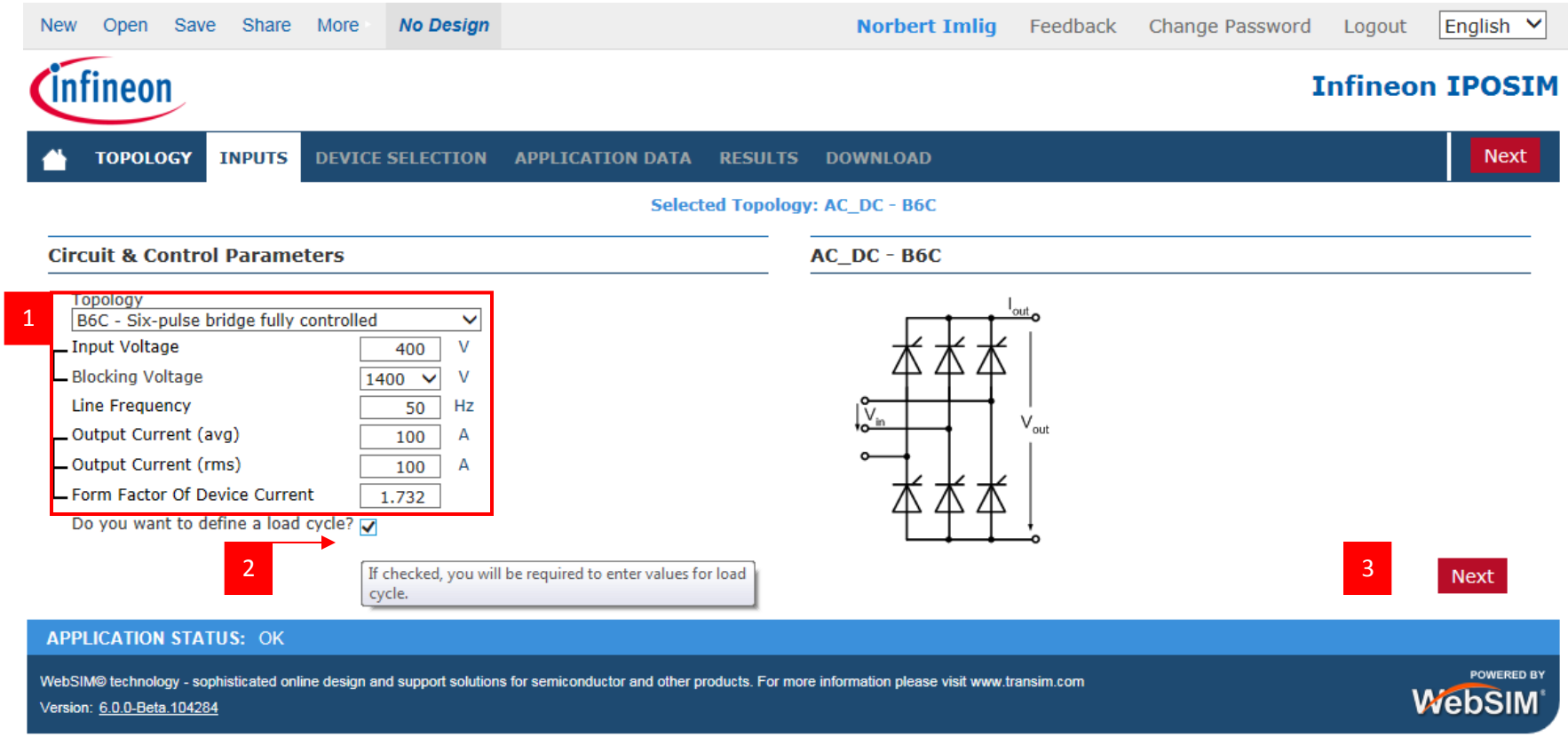
Topology: select your Application

1. first step, please select your application & topology
2. In our example click on "B6C Six-pulse bridge fully controlled"
3. If not already done select your preferred language



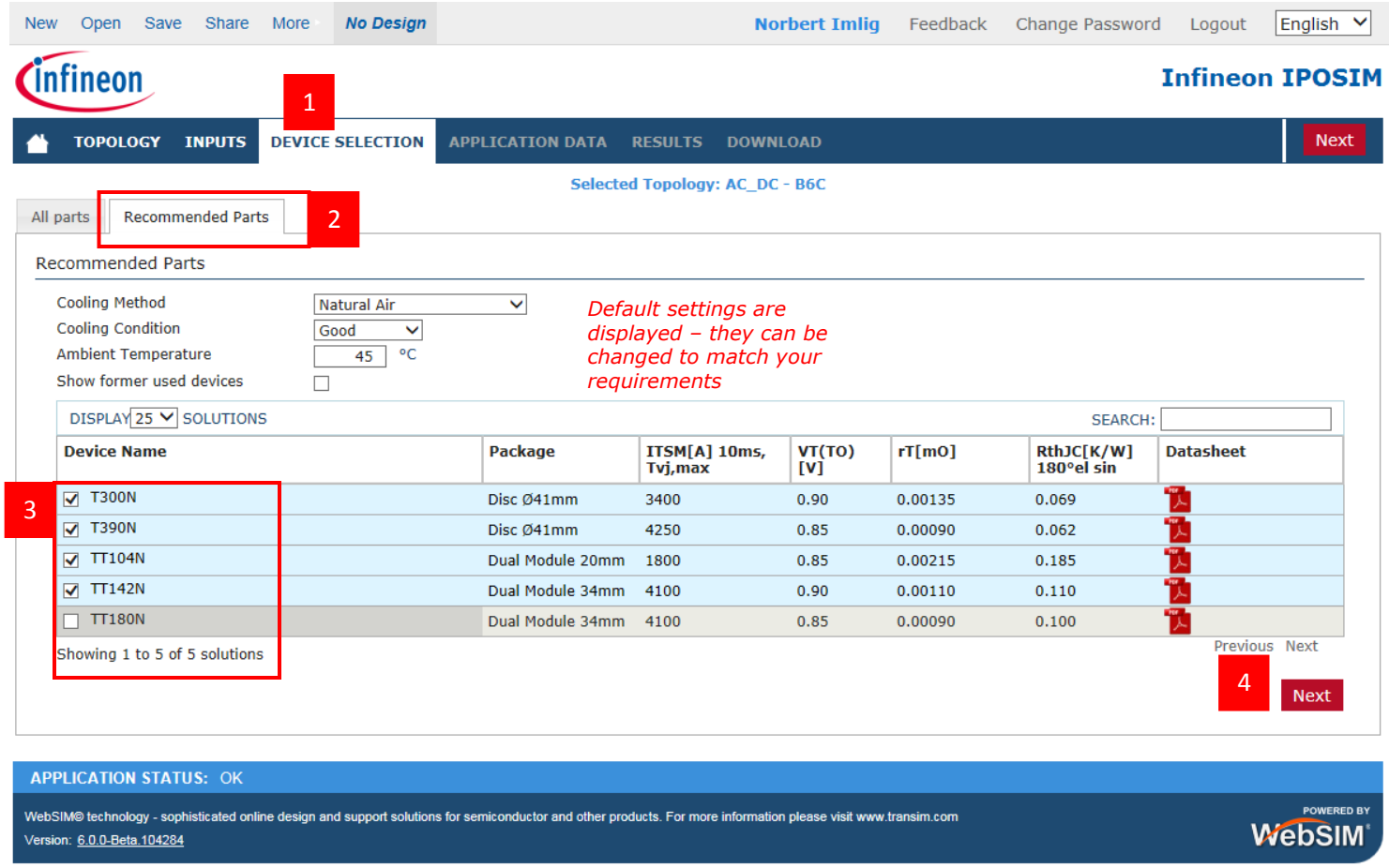
Input: define Circuit & Control Parameters

1. Now, please specify the application input & output parameters.
2. If you like, you can also specify a time depended load profile/cycle by checking the box.
3. Continue by clicking “Next”.



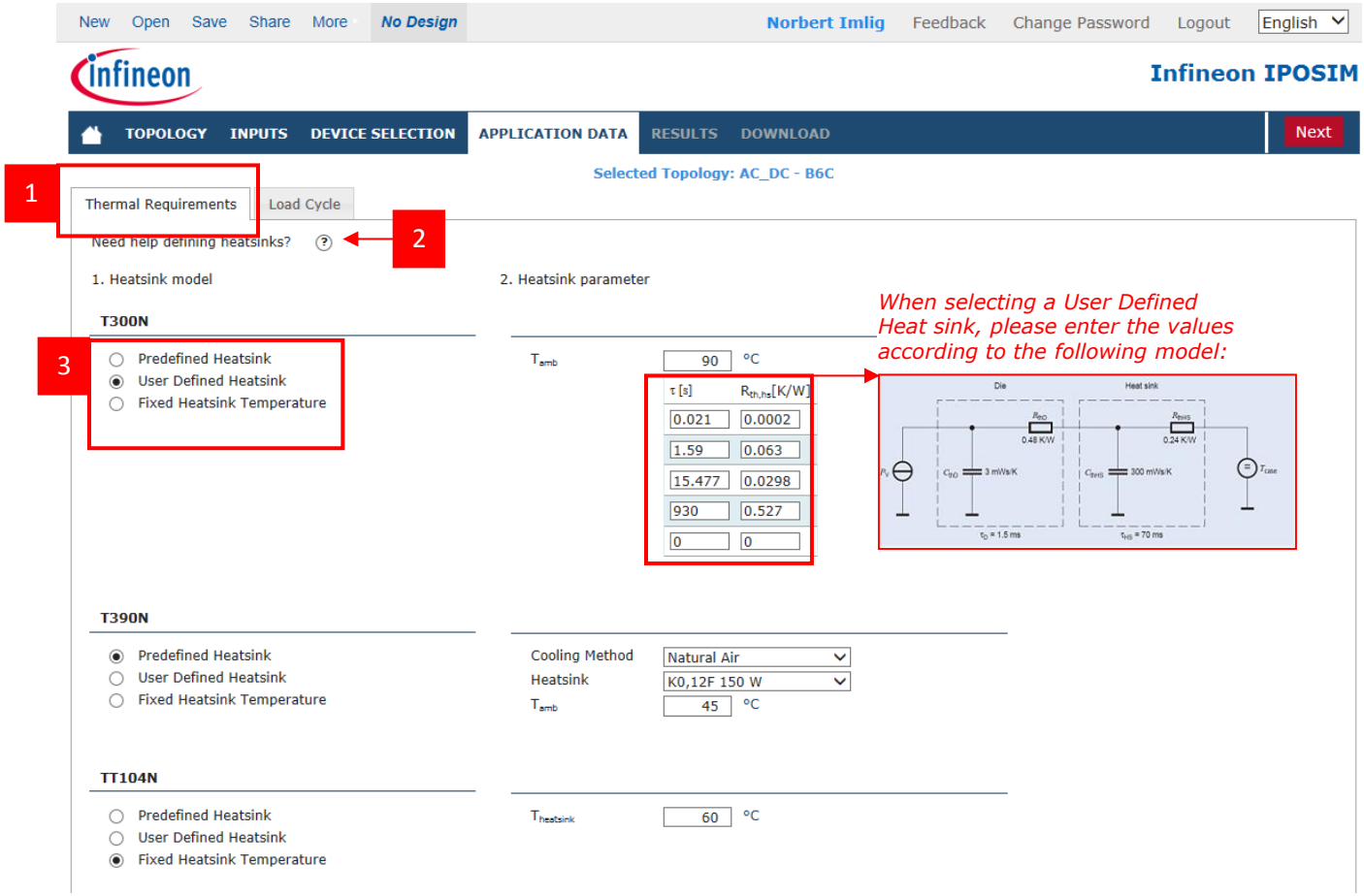
Device Selection: get the Right Parts

1. Now all available parts matching your criteria are displayed.
2. Switch to the "Recommended parts" tab to define additional environmental parameters, such as cooling method & ambient temperature.
3. You are given the option to select up to 5 devices in order to compare their individual performance. Additionally, you can access the respective datasheets with only one click.



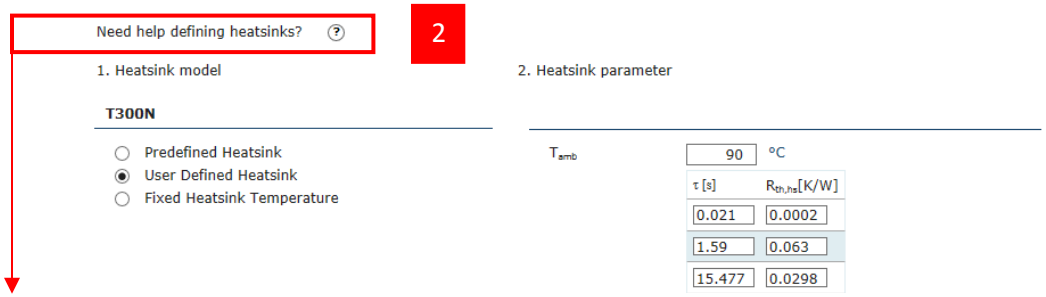
Application Data 1/2: set Thermal Requirements

1. First select the tab Thermal Requirements
2. Click on Help (?) for displaying possible combinations of Disc Devices and Heat sinks (details on next page)
3. Now you can define the heat sink by selecting a standard or user defined heat sink type.



Application Data 2/2: Help for Heat Sink

1. As our main example is based on a selection of bipolar products, let's have a little side-track to show you this step with a selection of IGBTs.
2. Click on Help (?) for displaying possible combinations of Disc Devices and Heat sinks (details on next page)



Help Defining Heat sink Values

When entering data for a heat sink, please consider the following: Available heat sink values may be characterized based on the base plate size of the selected module - regardless of the implemented circuit configuration within the module itself (e.g. "FF..." --> two IGBT/Diode switches, "FS..." --> six IGBT/Diode switches).

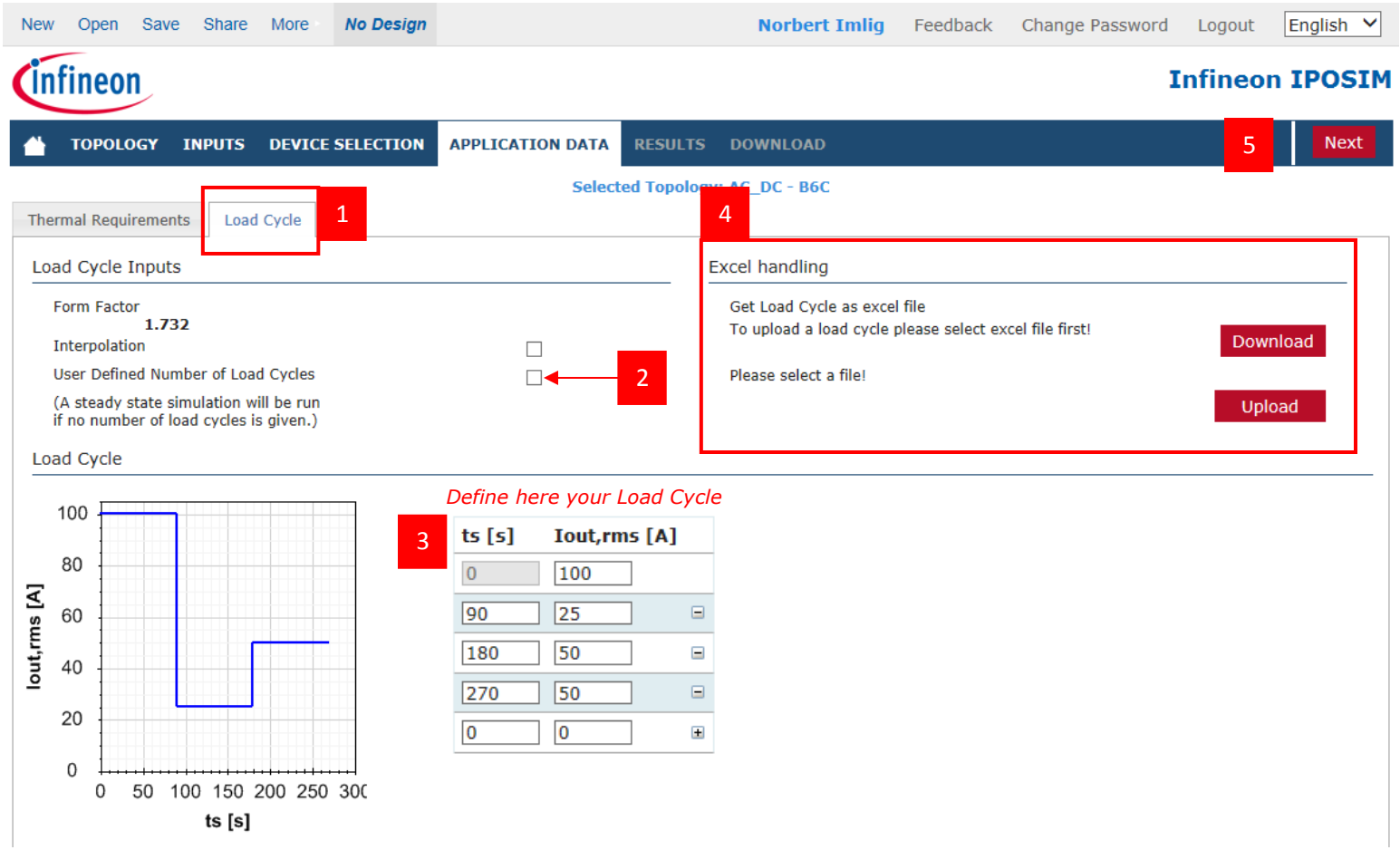
Since IPOSIM will do the loss and temperature calculation per single IGBT and Free-Wheeling Diode, the entered Rth,hs values shall be given per single IGBT/Diode switch. Therefore available heat sink values have to be adapted to the circuit configuration of the selected module by a correction factor according to the following table:

Configuration	Correction Factor
FZ (single switch)	1
DZ (single diode)	1
FF (half bridge)	2
DD (dual diode)	2
FT (Tripack)	3
F4 (4-pack)	4
FD, DF (chopper)	2
FS (Sixpack)	6
FB, FP (PIM)	7

I.e. multiply the heat sink Rth,hs values by x1 for a single switch module, x2 for half bridge modules, ...). Time constants (τ values) don´t need to be changed.

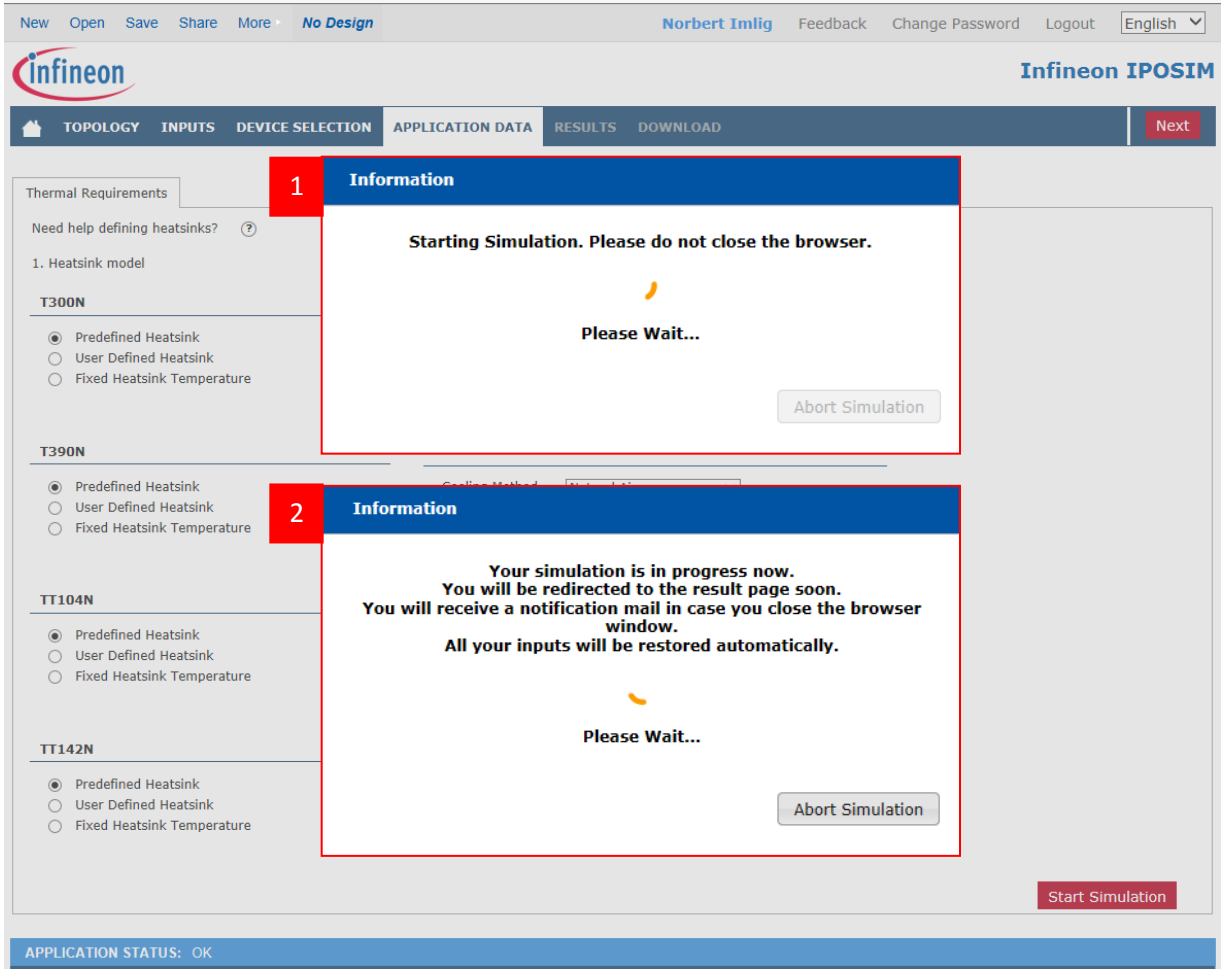
Application Data: set Load Cycle

1. Now select the tab Load Cycle
2. For transient analysis you can select the # of cycles
3. Define your Load Cycle
4. Instead, you can also upload/download the data directly in Excel format



Start the Simulation

1. If a simulation runs fast you can wait for the results
2. However, if it takes a bit longer, we will notify you by your email you registrated



Results: Is your configuration OK?

1. x means that your configuration is not OK, please re-design your application and test again
2. ✓ mark shows you that the junction temperature is within the range
3. If you defined a load cycle a graph with the temperature and losses is shown

New Open Save Share More **No Design** Norbert Imlig Feedback Change Password Logout English

Infineon **Infineon IPOSIM**

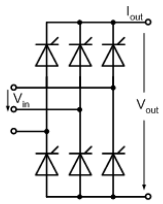
TOPOLOGY | INPUTS | DEVICE SELECTION | APPLICATION DATA | RESULTS | DOWNLOAD | Next

Selected Topology: AC_DC - B6C

Input Requirements Change Inputs & Re-run Analysis

Input Voltage	400	V
Blocking Voltage	1400	V
Input Frequency	50	Hz
Average Output Current	100	A
RMS Output Current	100	A
Form Factor	1.732	
Average Input Current per Arm	33.3333	A
RMS Input Current per Arm	57.735	A
RMS Input Current per Phase	81.6497	A

AC_DC - B6C



Modules

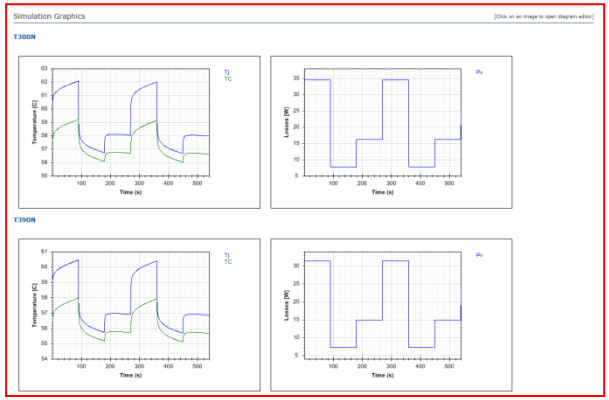
Heatsink Parameters			Heatsink Parameters			Heatsink Parameters			Heatsink Parameters		
T300N			**T390N**			**TT104N**			**TT142N**		
T_{amb}	90	°C	T_{amb}	45	°C	T_{amb}	45	°C	T_{amb}	45	°C
User Defined Heatsink			Predefined Heatsink			Predefined Heatsink			Predefined Heatsink		
R_{th}	2.944	K/W	K0,36S			KM14 1 module			KM14 1 module		
			Cooling Method	natural		Cooling Method	natural		Cooling Method	natural	
			R_{th}	0.411	K/W	R_{th}	1.21	K/W	R_{th}	1.06	K/W
Simulation Results			**Simulation Results**			**Simulation Results**			**Simulation Results**		
Junction Temperature			**Junction Temperature**			**Junction Temperature**			**Junction Temperature**		
Calculated	194	°C ✗	Calculated	60.37	°C ✓	Calculated	103	°C ✓	Calculated	88.67	°C ✓
Maximum	125	°C	Maximum	125	°C	Maximum	140	°C	Maximum	125	°C
P_{arm}	34.50	W	P_{arm}	31.33	W	P_{arm}	35.50	W	P_{arm}	33.67	W
P_{tot}	207	W	P_{tot}	188	W	P_{tot}	213	W	P_{tot}	202	W
$T_{Heatsink}$	191.57	°C	$T_{Heatsink}$	57.89	°C	$T_{Heatsink}$	88.07	°C	$T_{Heatsink}$	80.62	°C

1 2

✓ Calculated junction Temperature is within range.

✗ Calculated junction Temperature is greater than maximum junction temperature.

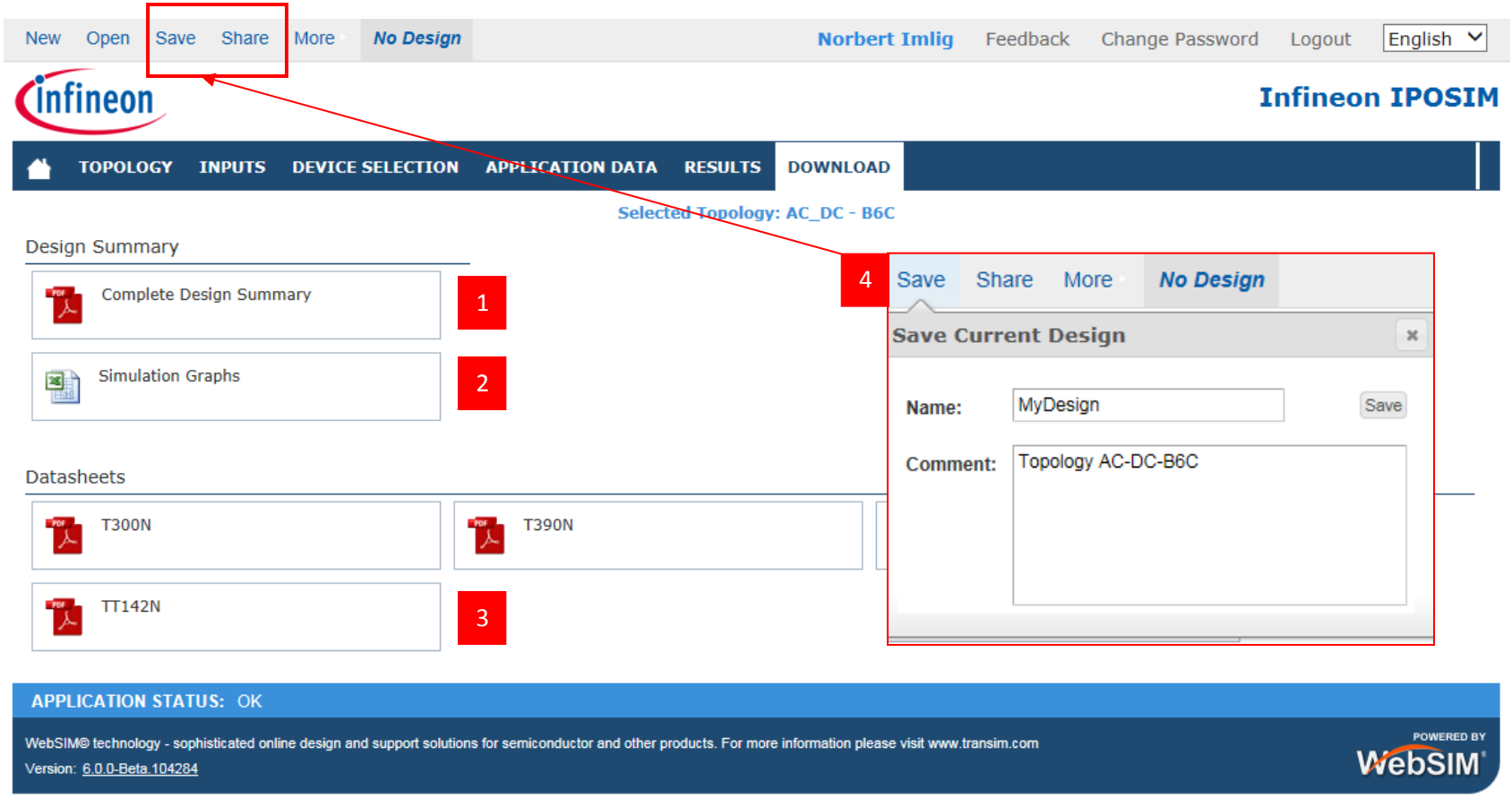
3 *Simulation Graphs showing Temperature & Losses*



SIMULATION BY Portunus

Download: get the results saved

1. Here, you can download a Complete Design Summary
2. And the Simulation Graphs in Excel format
3. Also the datasheet of your configuration is available
4. You can save your design and share it with your peers



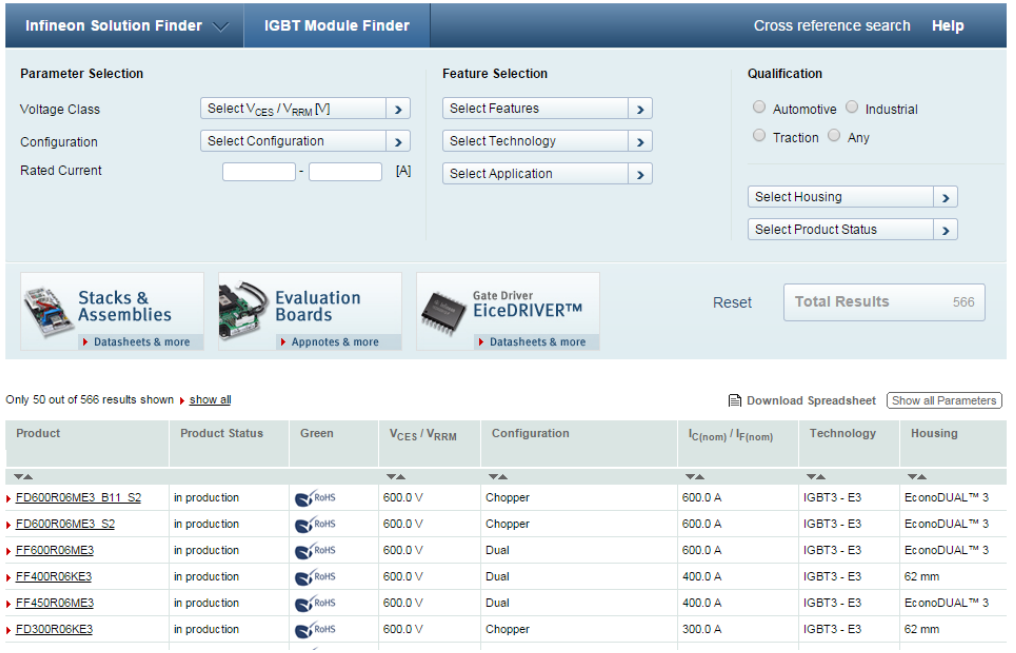
Thank you for using IPOSIM!

Feedback

We are looking forward to your Feedback!

Other Resources

1. Solution Finder
2. Stack and Assembly
3. Evaluation Boards



ENERGY EFFICIENCY
MOBILITY
SECURITY

Innovative semiconductor solutions for energy efficiency, mobility and security.