Self-Service plecs Model Generator (SSPMG)

User Guide

Outline of User Guide

1. Introduction to Self-Service PLECS Model Generator: What is it and What are the benefits
2. Step by Step Tool Flow
3. Deploying PLECS Models in Elite Power Simulator and PLECS Stand Alone

Outline of User Guide

1 Introduction to Self-Service PLECS Model Generator: What is it and What are the benefits

2 Step by Step Tool Flow

3 Deploying PLECS Models in Elite Power Simulator and PLECS Stand Alone

PLECS Basics

- PLECS is a system level simulator that facilitates the modeling and simulation of complete systems with optimized device models for maximum speed and accuracy. PLECS is not a SPICE-based circuit simulator, where the focus is on low-level behavior of circuit components .
- Power transistors are treated as simple switches that can be easily configured to demonstrate losses associated with conduction and switching transitions.
- The PLECS models, referred to as “thermal models”, are composed of lookup tables for conduction and switching losses, along with a thermal chain in the form of a Cauer or Foster equivalent network.
- During simulation, PLECS interpolates and/or extrapolates using the loss tables to get the bias point conduction and switching losses for the circuit operation. Access the onsemi Elite Power Simulator powered by plecs

www.onsemi.com/elite-power-simulator

onsemi’s State-of-the-Art PLECS Models:

- Typical industry PLECS models are composed of measurement based loss tables that are consistent with datasheets provided by the manufacturer.

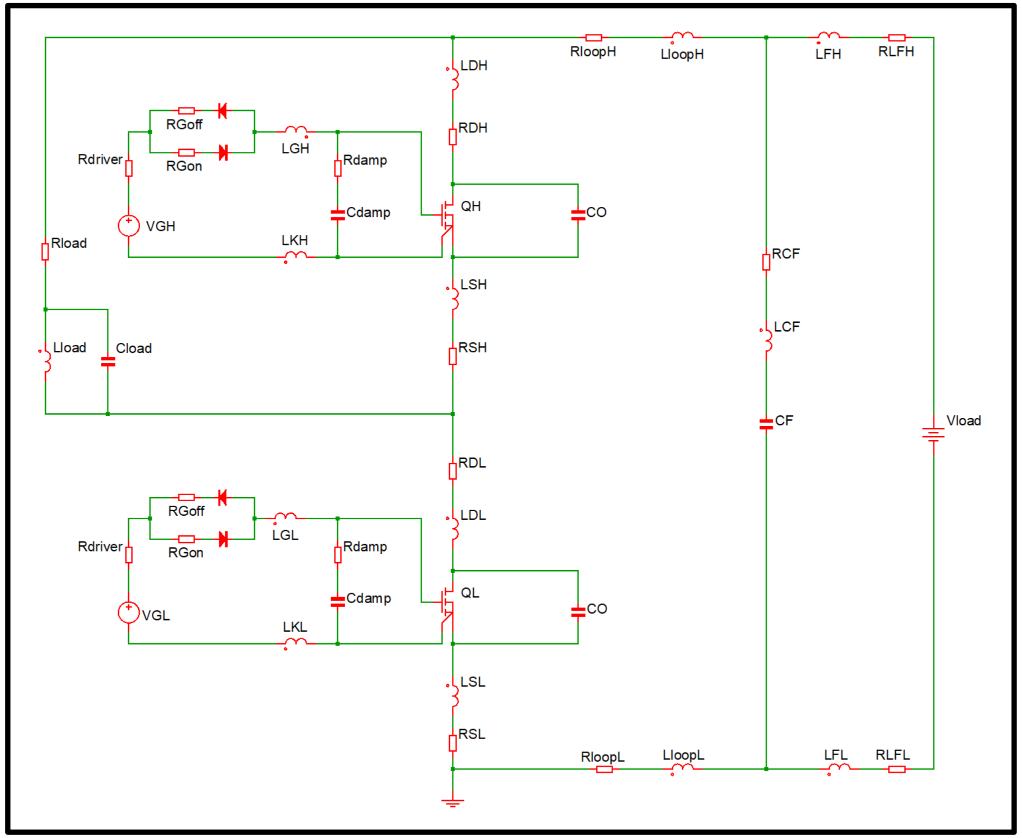
  There are four major problems with this approach:

  1. The switching energy loss data is dependent on the parasitics of the measurements set ups and circuits.
  2. The conduction and switching energy loss data is limited and thus is often not dense enough to ensure accurate interpolation and minimal extrapolation by PLECS.
  3. The loss data is based on nominal semiconductor process conditions only.
  4. The switching energy loss data comes from datasheet double pulse generated loss data. This means the PLECS models are only valid for hard switching topology simulation. The models are highly inaccurate if used in soft switching topology simulation.

- onsemi’s Self-Service PLECS Model Generator (SSPMG) provides solutions to all four problems.
- Ultimate power is delivered to the user to build PLECS models tailored for the user’s application. Unleash the power here: www.onsemi.com/self-plecs-generator

Measurement Parasitics Influence on Switching Performance

Switching Schematic with Parastics



Example Datasheet

Parameter	Switching Loss
Eon [uJ]	490
Eoff [uJ]	221
Etotal [uJ]	711

≠

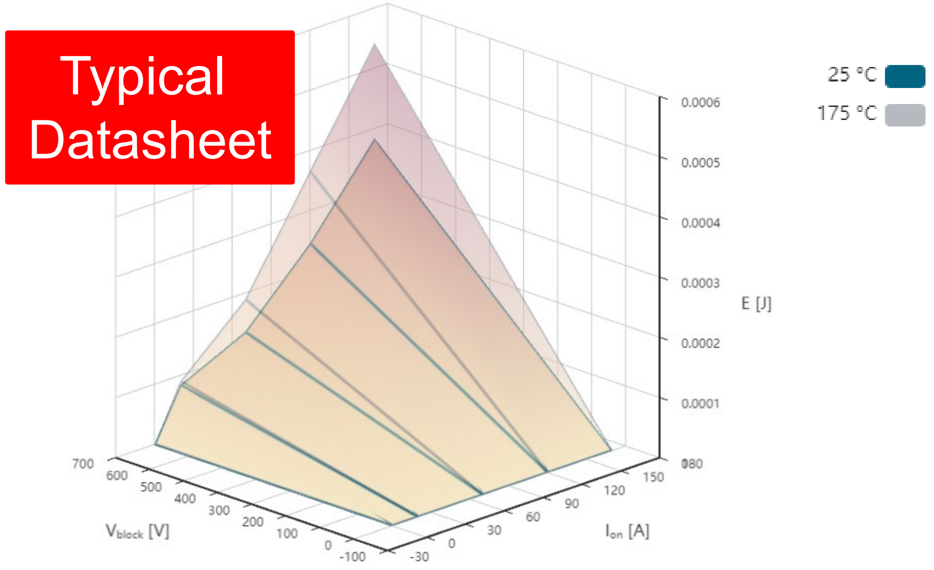
Customer Application

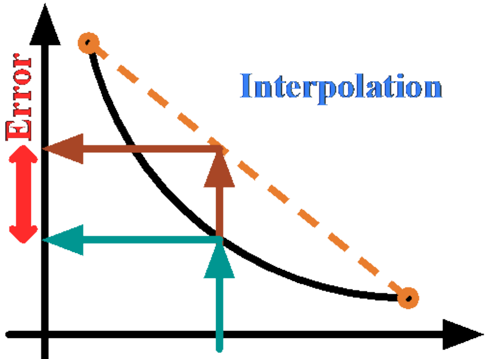
Parameter	Switching Loss
Eon [uJ]	415
Eoff [uJ]	231
Etotal [uJ]	646

- Crucial to understand that the lab test circuit’s passives, parasitics, gate driver performance, etc. all affect losses.
- Where does this leave the user for a PLECS model? The user application will surely have a different environment than any of the component supplier’s lab and board setups.

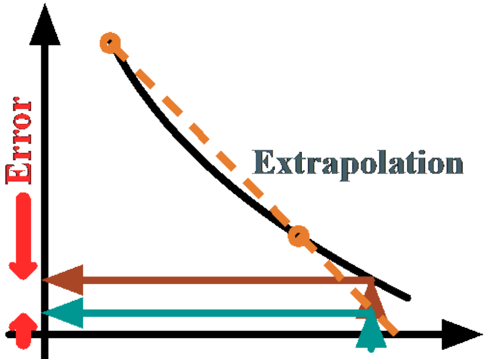
Loss Table Density and Limits Influence Results

- Datasheet data is often not dense enough to ensure accurate <u>interpolation</u> by PLECS in nonlinear environments.
- Datasheet data limits often do not bound the entire operating range causing highly inaccurate <u>extrapolation</u> by PLECS.

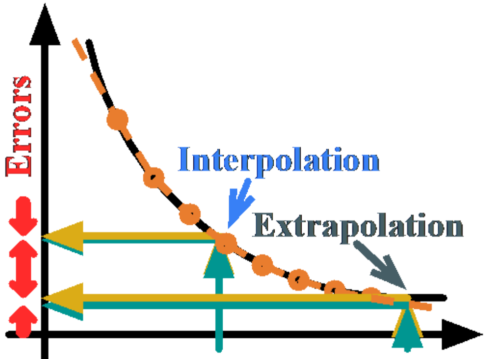

Typical Datasheet



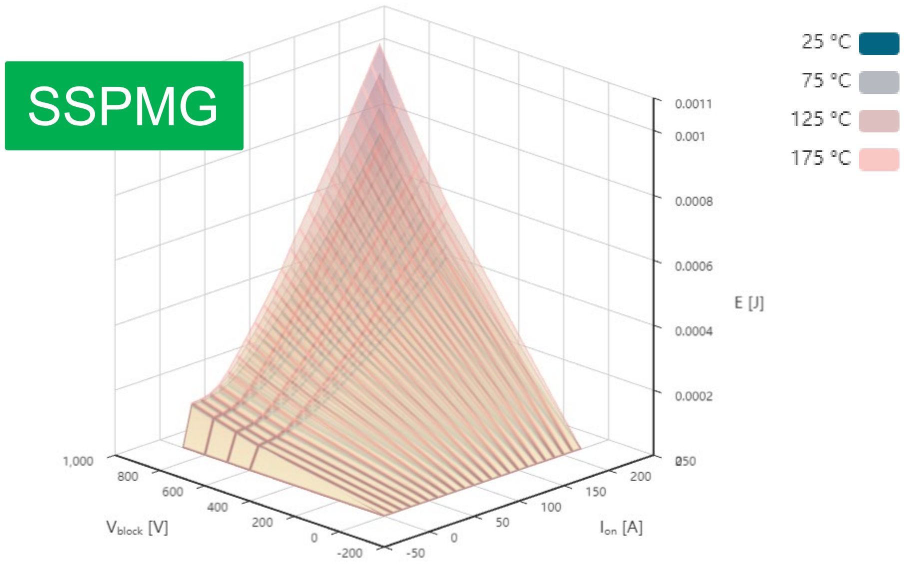
Interpolation with small data set



Extrapolation with small data set



Interpolation & Extrapolation with large data set


SSPMG

Corner PLECS Models

- Conventional PLECS models based on measurements are only valid for the typical or nominal process case in manufacturing. onsemi has developed accurate corner PLECS models based on real manufacturing distribution.
- Physics dictates that worst case conduction and switching losses do not happen simultaneously for example.
- Depending on the application, the influence of conduction and switching energy losses on the overall system performance will vary. The onsemi corner PLECS models provide the user the flexibility to investigate the entire correlated space.
- Corner models currently only available for EliteSiC products. FS7 IGBT corner models are coming soon.
- Accurate corner and statistical modeling covered in detail in
  - SiC MOSFET Corner and Statistical SPICE Model Generation – Proceeding of International Symposium on Power Semiconductor Devices and ICs (ISPSD), pp. 154-147, September 2020

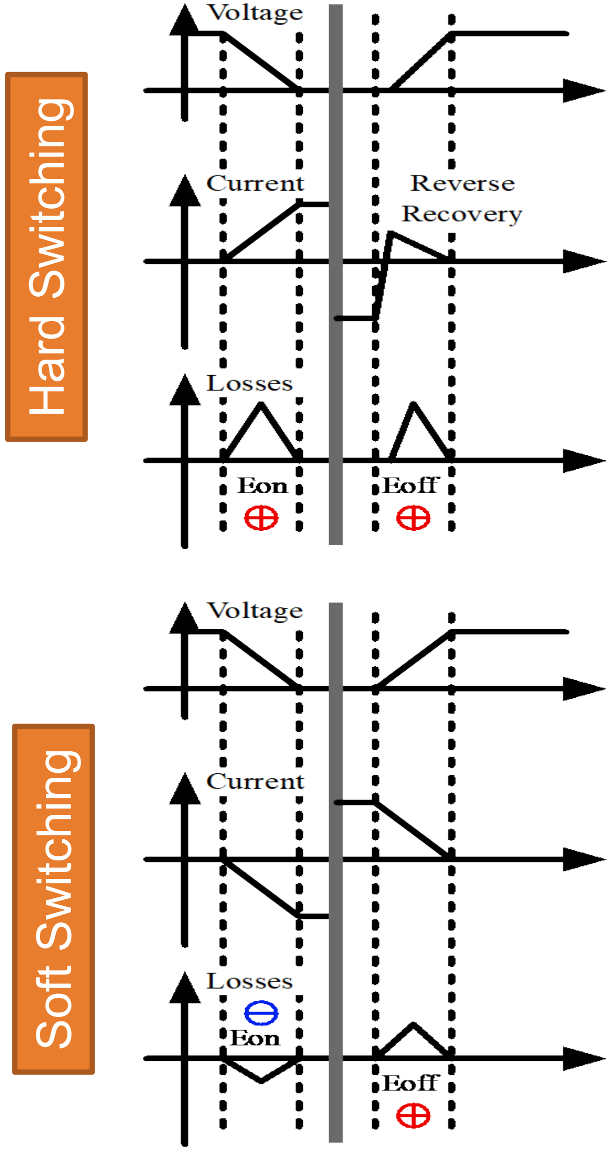
Process Condition	R_{DSon}, V_{th}, BV	Capacitance, Device RG	Conduction Loss	Switching Energy Loss
Nominal	Nominal	Nominal	Nominal	Nominal
Best Case Conduction Loss, Worst Case Switching Loss	Low	High	Low	High
Worst Case Conduction Loss, Best Case Switching Loss	High	Low	High	Low

Soft Switching Energy Losses

Soft
Switching
Simulation*

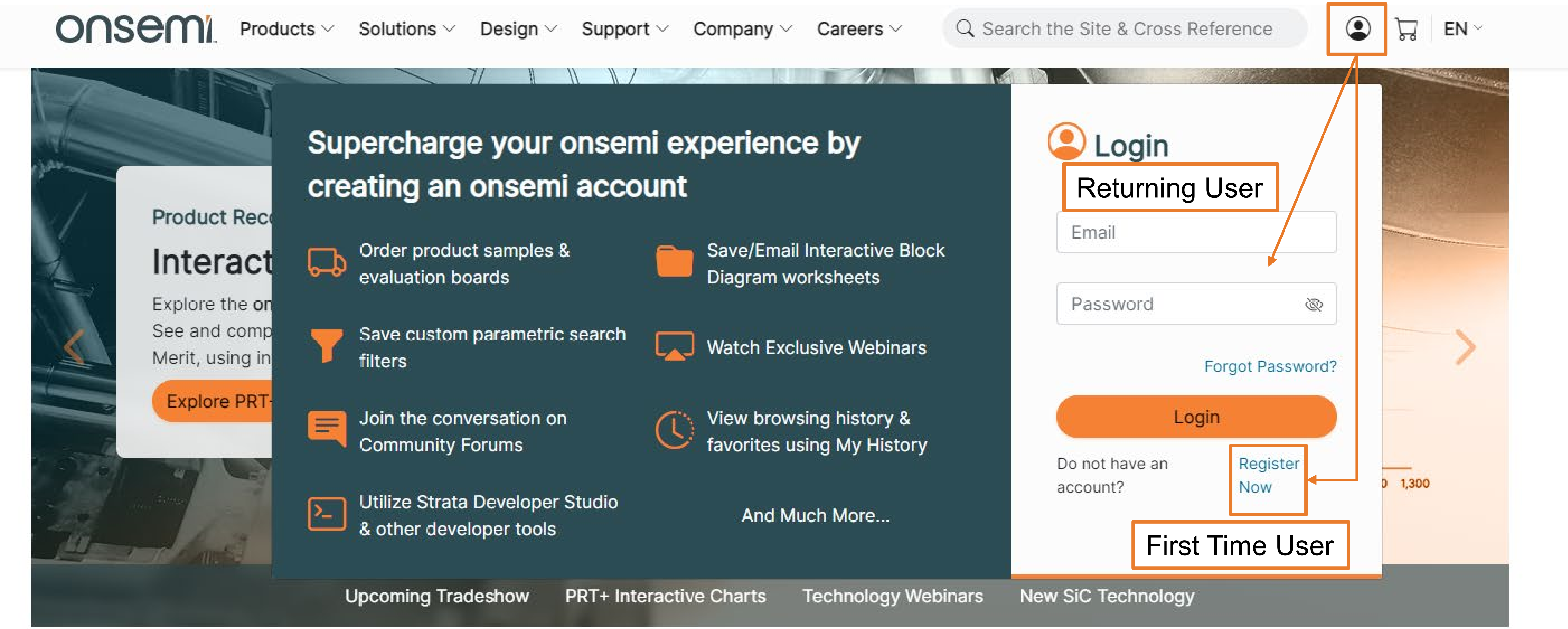
onsemi provides **industry first** PLECS models valid for soft switching simulation of applications such as DC-DC LLC and CLLC Resonant, Dual Active Bridge, and Phase Shifted Full Bridge.

The Double Pulse Test is **NOT** representative of Soft Switching. Using double pulse switching energy losses in the simulation of a Soft Switching Topology is highly inaccurate.



Access SSPMG with MYON Account

MyON is required to use the SSPMG



MYON Login

Supercharge your onsemi experience by creating an onsemi account

- Order product samples & evaluation boards
- Save/Email Interactive Block Diagram worksheets
- Save custom parametric search filters
- Watch Exclusive Webinars
- Join the conversation on Community Forums
- View browsing history & favorites using My History
- Utilize Strata Developer Studio & other developer tools
- And Much More...

Login

Returning User

Email

Password

Forgot Password?

Login

Do not have an account? Register Now

First Time User

Outline of User Guide

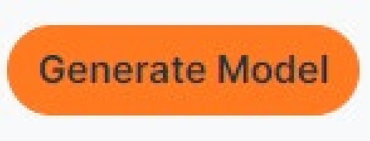
1 Introduction to Self-Service PLECS Model Generator: What is it and What are the benefits

2 Step by Step Tool Flow

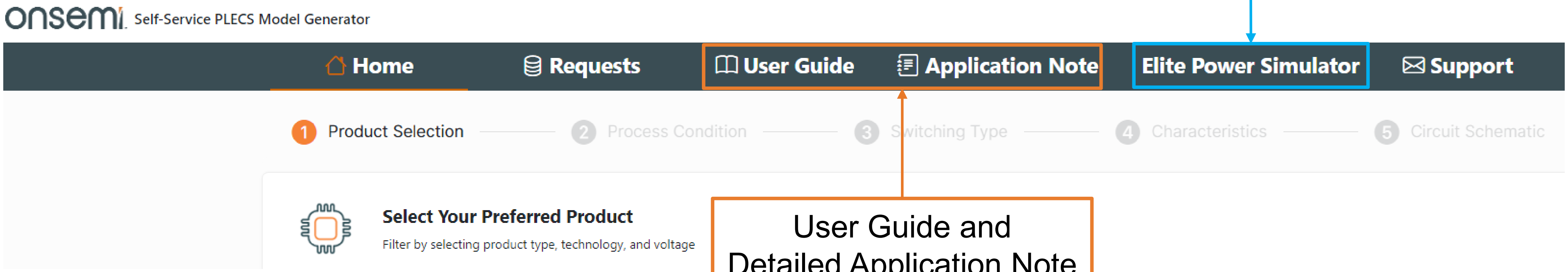
3 Deploying PLECS Models in Elite Power Simulator and PLECS Stand Alone

Getting Started

Go to landing page
www.onsemi.com/self-plecs-generator
and select Generate Model



Link to Elite Power Simulator

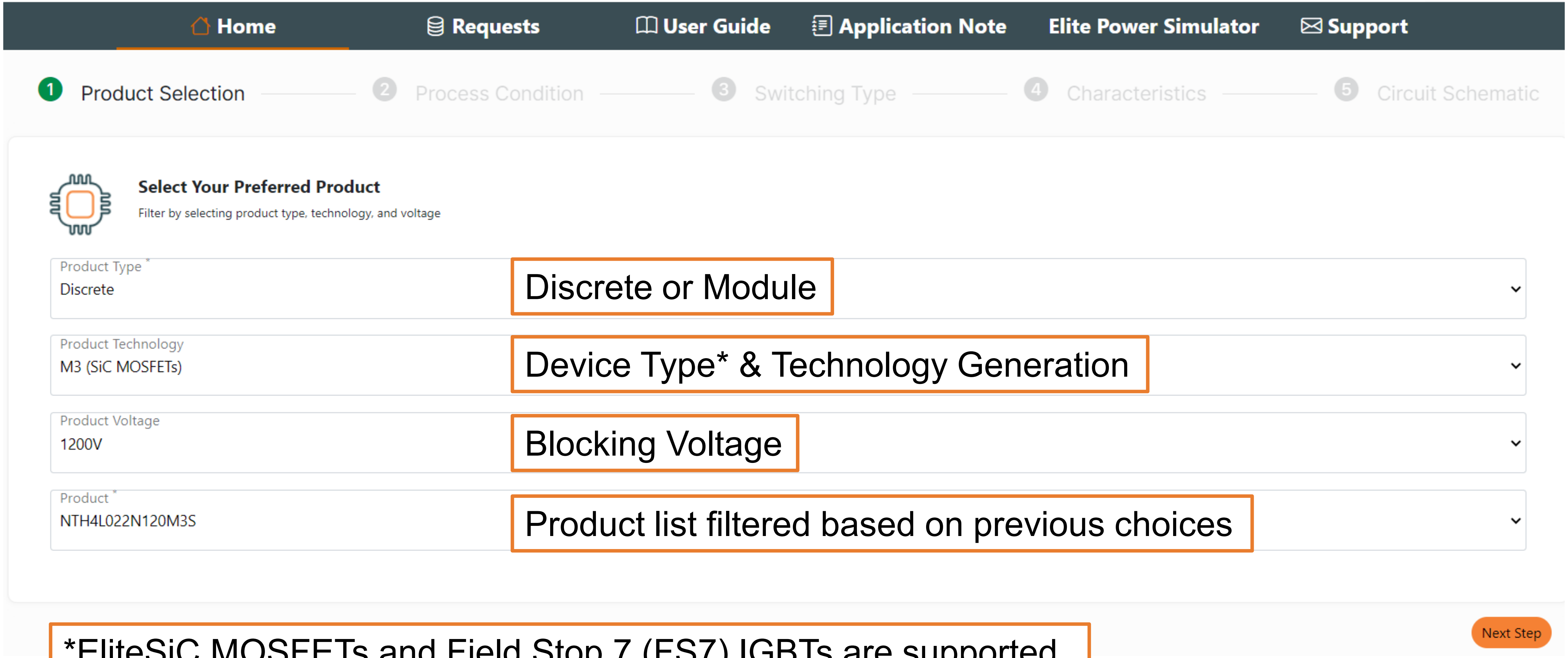


Select Your Preferred Product

Filter by selecting product type, technology, and voltage

User Guide and
Detailed Application Note

Step 1: Select Product



Select Your Preferred Product

Filter by selecting product type, technology, and voltage

Product Type *
Discrete

Discrete or Module

Product Technology
M3 (SiC MOSFETs)

Device Type* & Technology Generation

Product Voltage
1200V

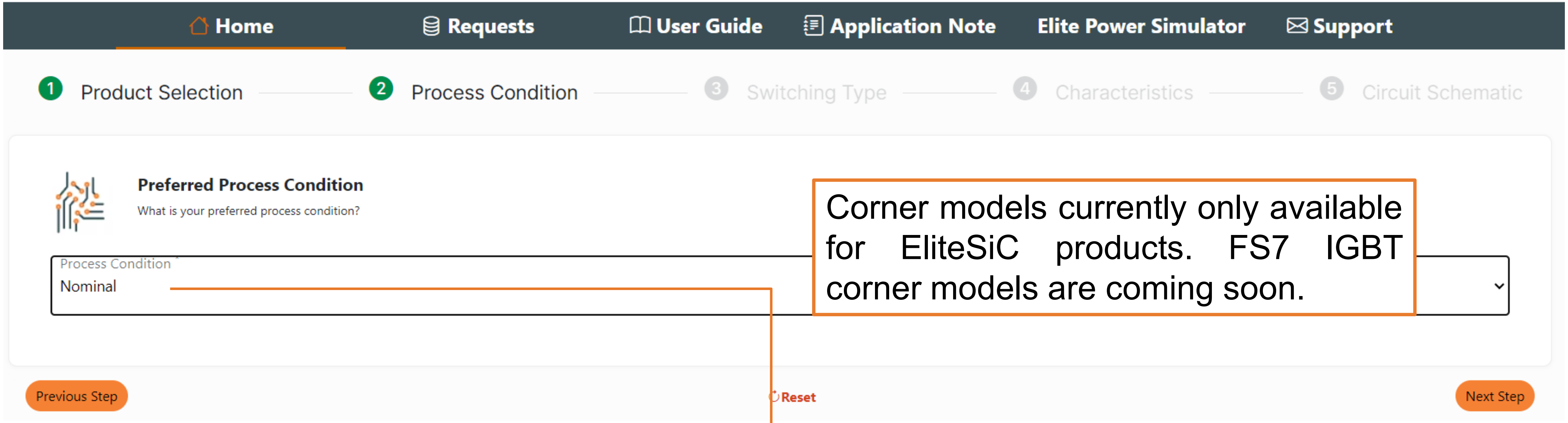
Blocking Voltage

Product *
NTH4L022N120M3S

Product list filtered based on previous choices

*EliteSiC MOSFETs and Field Stop 7 (FS7) IGBTs are supported.

Step 2: Set Process Condition



Preferred Process Condition

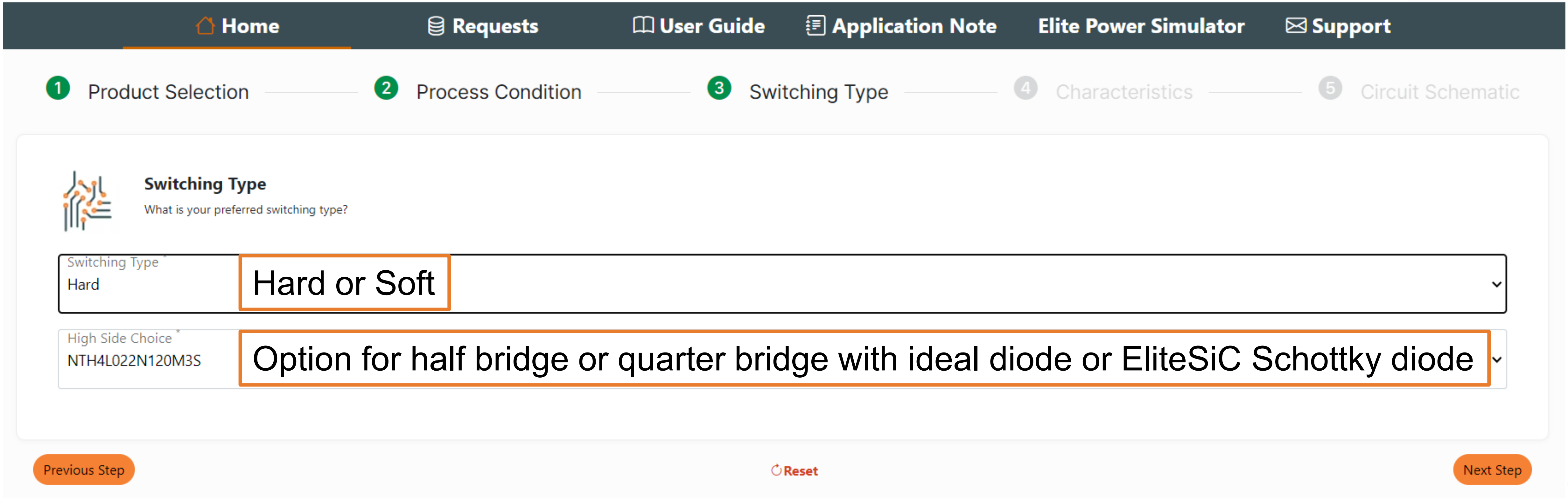
What is your preferred process condition?

Process Condition: Nominal

Corner models currently only available for EliteSiC products. FS7 IGBT corner models are coming soon.

Process Condition	R_{DSon}, V_{th}, BV	Capacitance, Device RG	Conduction Loss	Switching Energy Loss
Nominal	Nominal	Nominal	Nominal	Nominal
Best Case Conduction Loss, Worst Case Switching Loss	Low	High	Low	High
Worst Case Conduction Loss, Best Case Switching Loss	High	Low	High	Low

Step 3: Set Switching Type



Switching Type

What is your preferred switching type?

Switching Type *: Hard

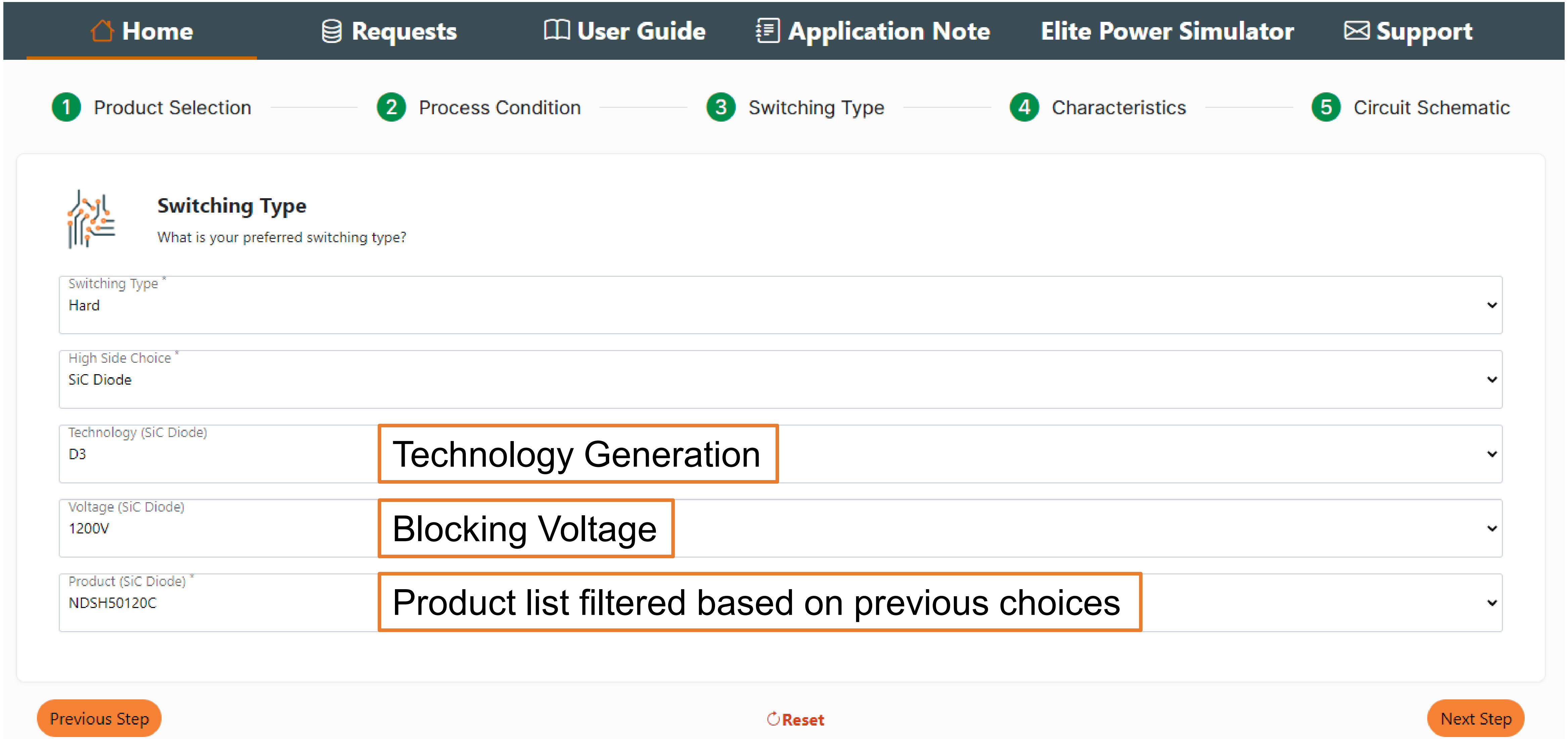
Hard or Soft

High Side Choice *: NTH4L022N120M3S

Option for half bridge or quarter bridge with ideal diode or EliteSiC Schottky diode

- Choose the switching type based on the intended application or topology.
- If hard switching chosen, user has choice for high side device to be in half bridge configuration or quarter bridge with ideal diode or EliteSiC Schottky diode on the high side.
- Example Soft Switching Topologies include DC-DC LLC and CLLC Resonant, Dual Active Bridge, and Phase Shifted Full Bridge.
- Subsequent step 4 “Characteristics” change slightly based on the Switching Type.

Step 3: Quarter Bridge with EliteSiC Schottky Diode



Switching Type

What is your preferred switching type?

Switching Type *
Hard

High Side Choice *
SiC Diode

Technology (SiC Diode)
D3

Voltage (SiC Diode)
1200V

Product (SiC Diode) *
NDSH50120C

Technology Generation

Blocking Voltage

Product list filtered based on previous choices

- User should make sure EliteSiC Schottky diode current rating is suitable to switch with the low side EliteSiC MOSFET.

Step 4: Set Characteristics (Hard Switching)

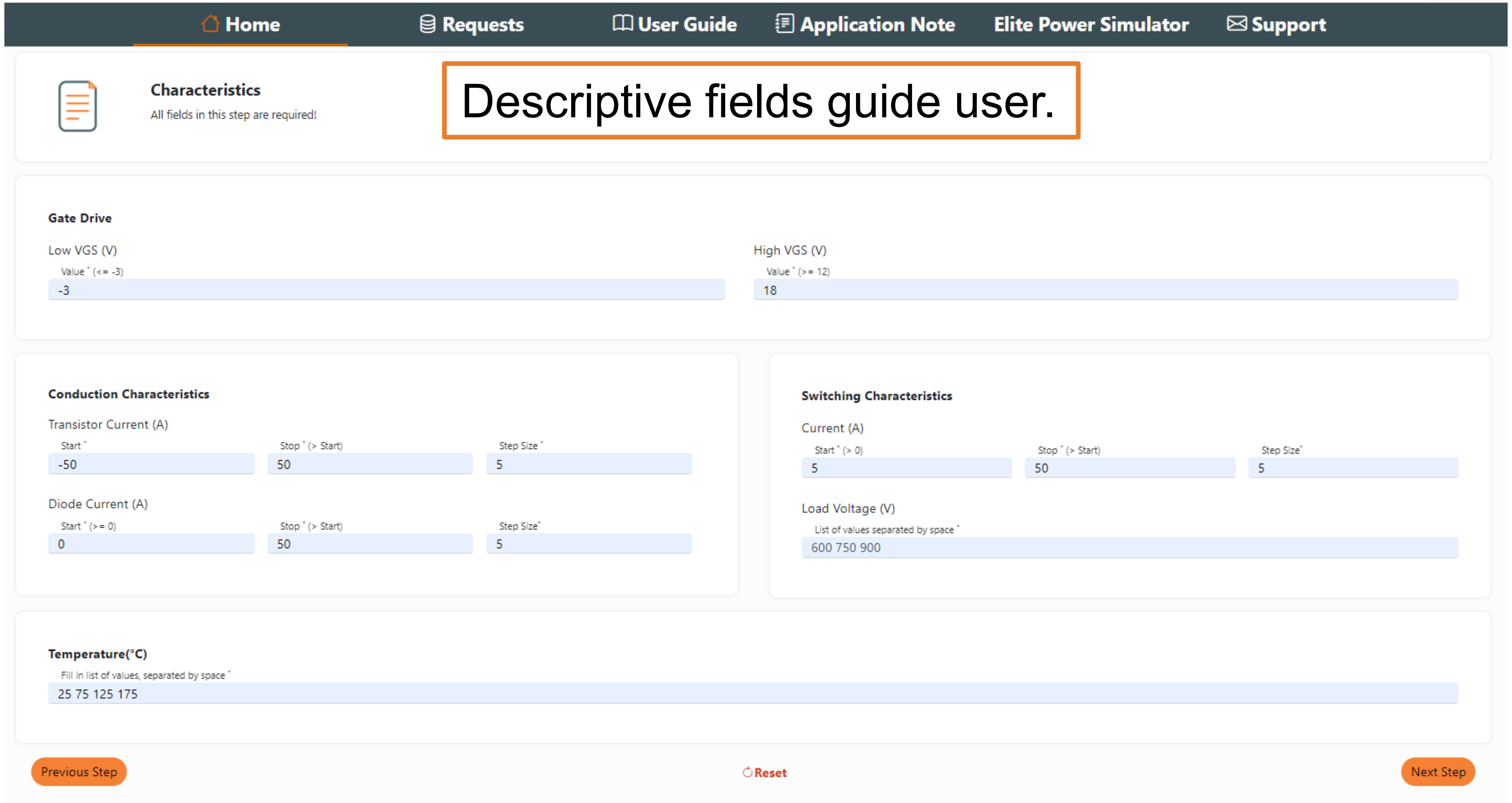
- Drain current can be in 1st and/or 3rd quadrant, so positive and/or negative.
- Diode Current is for diode forward conduction mode. Values are given in absolute scale.
- If (Stop-Start)/(Step Size) != Integer

Then the last point=Stop. Example:

Start=1 Stop=9 Step Size=3

Simulated points are: 1 4 7 9

- Gate drive High VGS must be >=10V for SiC MOSFETs/IGBTs to ensure current carrying capability
- Gate drive Low VGS must be <=0 to ensure full device turn off.



Characteristics

All fields in this step are required!

Descriptive fields guide user.

Gate Drive

Low VGS (V)
Value * (<= -3): -3

High VGS (V)
Value * (>= 12): 18

Conduction Characteristics

Transistor Current (A)
Start *: -50
Stop * (> Start): 50
Step Size *: 5

Diode Current (A)
Start * (>= 0): 0
Stop * (> Start): 50
Step Size*: 5

Switching Characteristics

Current (A)
Start * (> 0): 5
Stop * (> Start): 50
Step Size*: 5

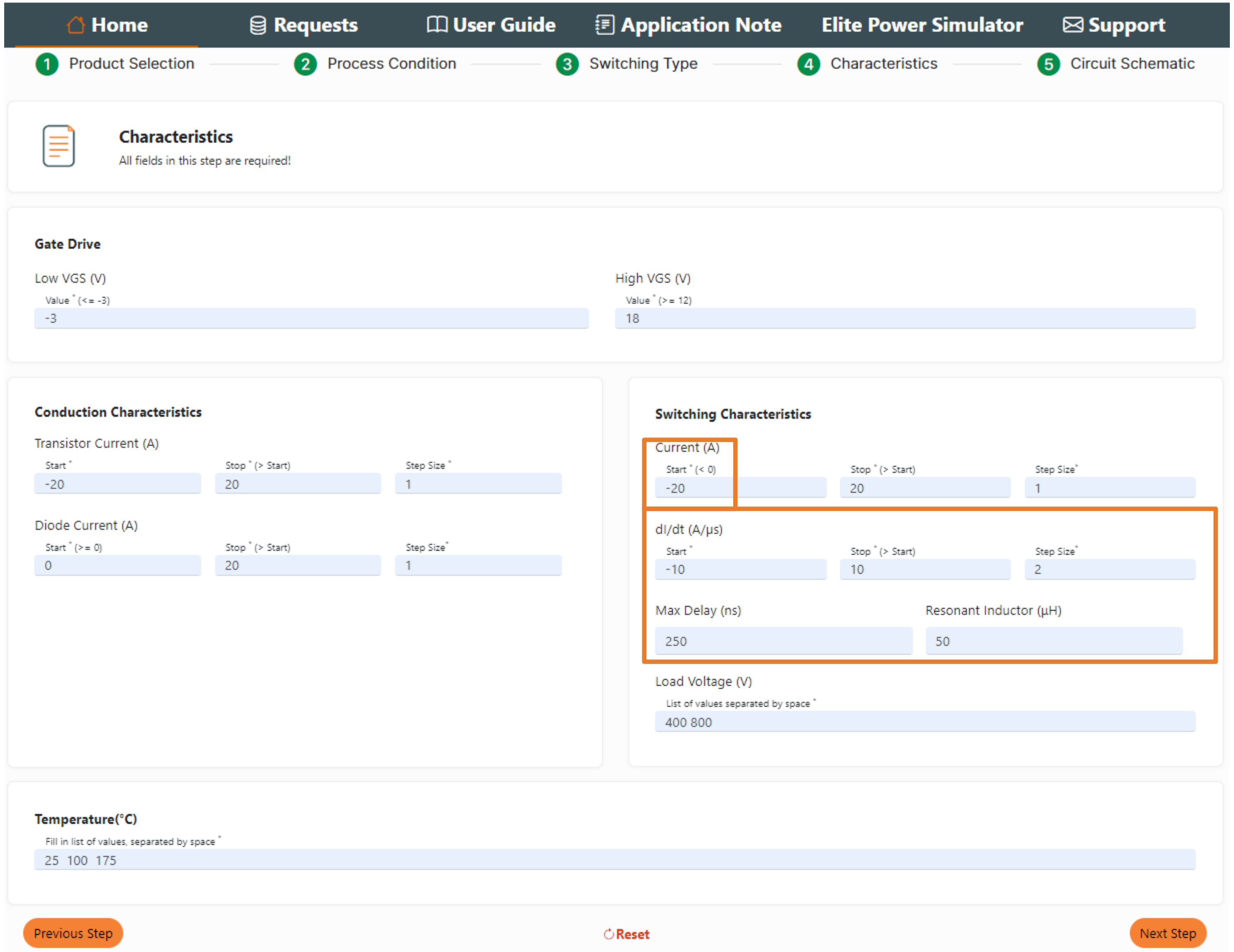
Load Voltage (V)
List of values separated by space *: 600 750 900

Temperature(°C)

Fill in list of values, separated by space *: 25 75 125 175

Step 4: Set Characteristics (Soft Switching)

- Soft Switching Changes:
  - Drain current can be in 1st and/or 3rd quadrant, so positive and/or negative when a switching event happens
- Soft Switching Additions:
  - **dI/dt**: in the resonant inductor when the switching event happens. This dI/dt is directly linked to the resonant inductor voltage by the Faraday’s law of induction E=L*di/dt. “didt” is a PLECS circuit parameter passed into the PLECS model to evaluate the losses in soft switching.
  - **Max Delay:** maximum dead time allowed between high side and low side switches for the resonant transition to occur
  - **Resonant Inductor**



Characteristics

All fields in this step are required!

Gate Drive

Low VGS (V)
Value * (<= -3): -3

High VGS (V)
Value * (>= 12): 18

Conduction Characteristics

Transistor Current (A)

Start *	Stop * (> Start)	Step Size *
-20	20	1

Diode Current (A)

Start * (>= 0)	Stop * (> Start)	Step Size*
0	20	1

Switching Characteristics

Current (A)

Start * (< 0)	Stop * (> Start)	Step Size*
-20	20	1

dI/dt (A/µs)

Start *	Stop * (> Start)	Step Size*
-10	10	2

Max Delay (ns): 250

Resonant Inductor (µH): 50

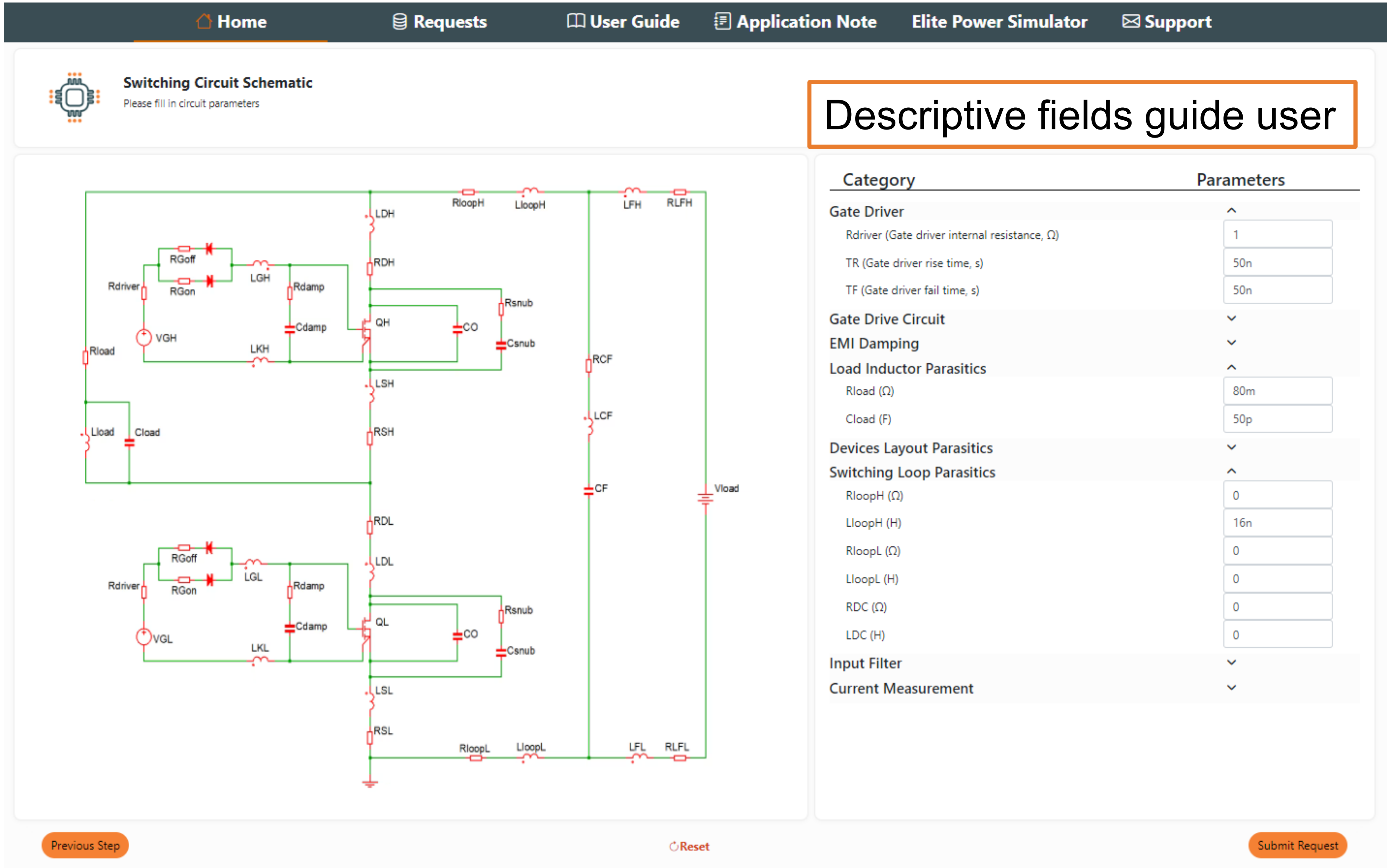
Load Voltage (V)
List of values separated by space *: 400 800

Temperature(°C)

Fill in list of values, separated by space *: 25 100 175

Step 5: Circuit Schematic (Half Bridge Discrete)

- Table of parameters matches circuit schematic.
- Default parameters are generally 0, allowing user to just enter needed values.
- Min and Max Gate Resistance parameter facilitate RG scaling in the PLECS model.
- Gate drive signal can be modeled through Rdriver, TF, and TR.



Switching Circuit Schematic

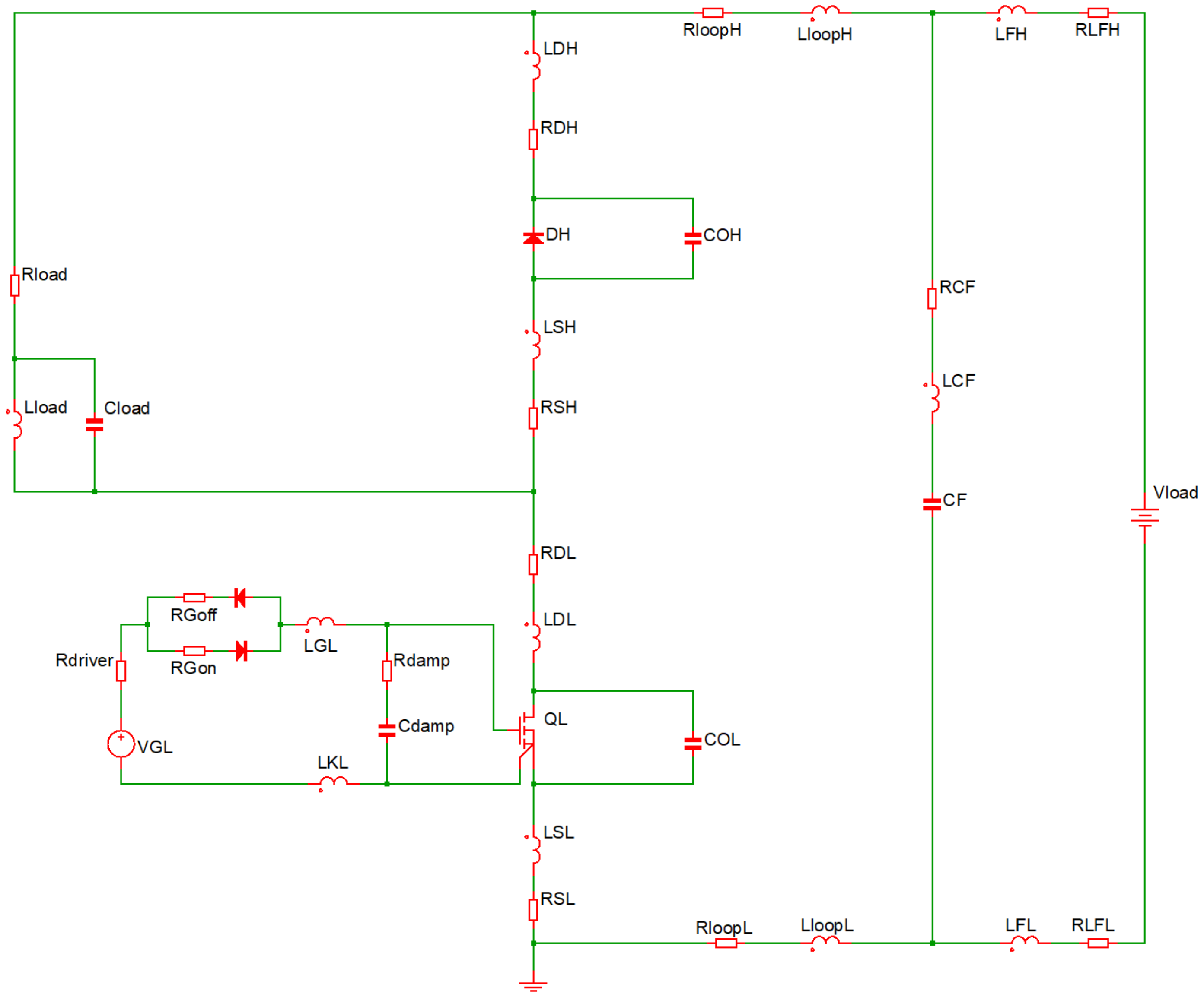
Please fill in circuit parameters

Descriptive fields guide user

Category	Parameters
Gate Driver	
Rdriver (Gate driver internal resistance, Ω)	1
TR (Gate driver rise time, s)	50n
TF (Gate driver fall time, s)	50n
Gate Drive Circuit	
EMI Damping	
Load Inductor Parasitics	
Rload (Ω)	80m
Cload (F)	50p
Devices Layout Parasitics	
Switching Loop Parasitics	
RloopH (Ω)	0
LloopH (H)	16n
RloopL (Ω)	0
LloopL (H)	0
RDC (Ω)	0
LDC (H)	0
Input Filter	
Current Measurement	

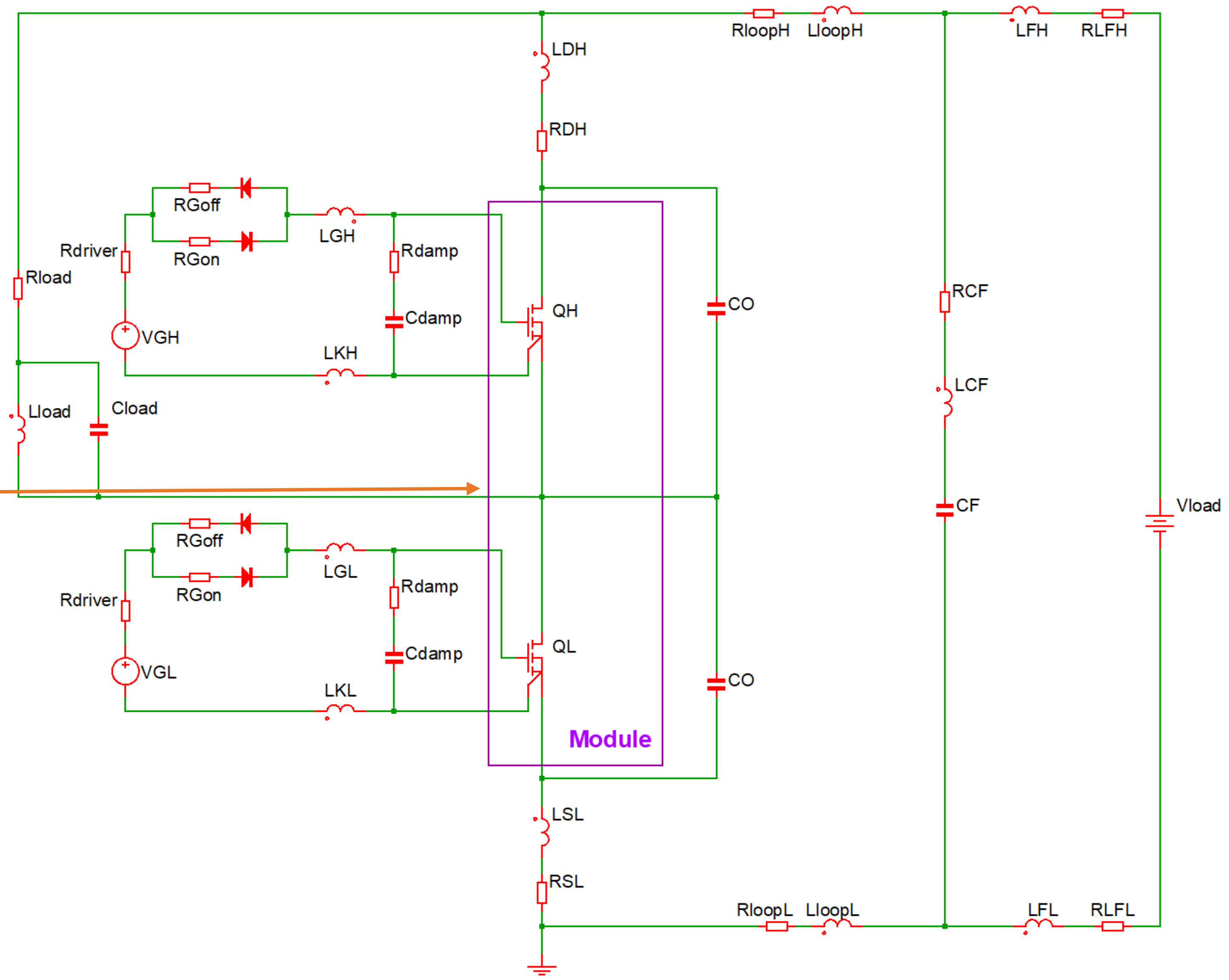
Step 5: Circuit Schematic (Quarter Bridge Discrete)

- High side choice can be:
  - Ideal diode with capacitance=0
  - EliteSiC Schottky diode
- Parasitic output capacitor is split into high side (COH) and low side (COL).



Step 5: Circuit Schematic (Half Bridge Module)

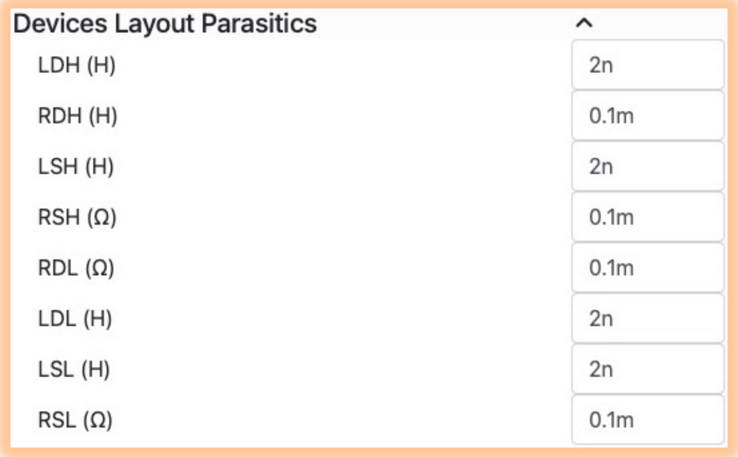
- All module parasitics are included in power module SPICE model.
- Remaining parameters are the same as discrete version.



Step 5: Circuit Parameters – Full list

Input Filter

RCF (Ω)	0.2m
LCF (H)	2n
CF (F)	3n
LFH (H)	5n
RLFH (Ω)	0.1m
LFL (H)	5n
RLFL (Ω)	0.1m

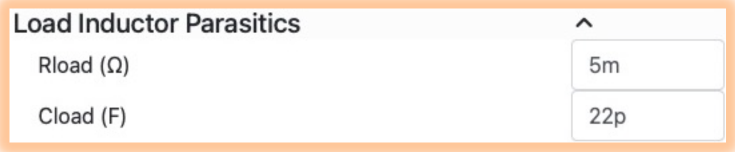


Devices Layout Parasitics

LDH (H)	2n
RDH (H)	0.1m
LSH (H)	2n
RSH (Ω)	0.1m
RDL (Ω)	0.1m
LDL (H)	2n
LSL (H)	2n
RSL (Ω)	0.1m

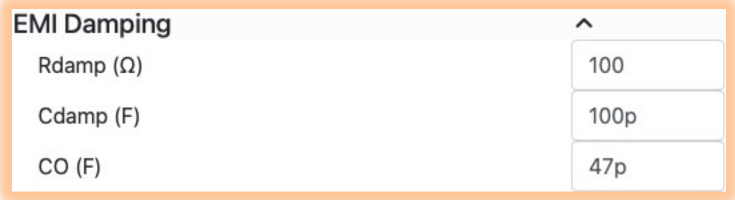
Switching Loop Parasitics

RloopH (Ω)	0.1m
LloopH (H)	2n
RloopL (Ω)	0.1m
LloopL (H)	2n



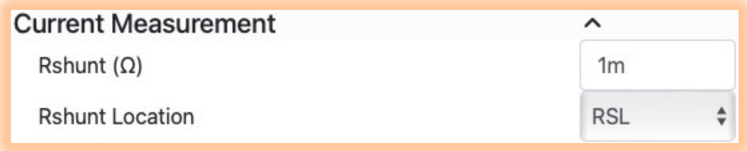
Load Inductor Parasitics

Rload (Ω)	5m
Cload (F)	22p



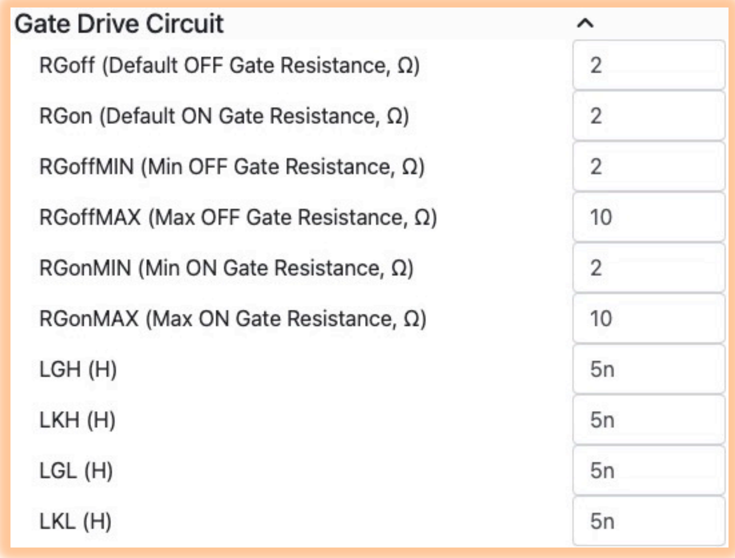
EMI Damping

Rdamp (Ω)	100
Cdamp (F)	100p
CO (F)	47p



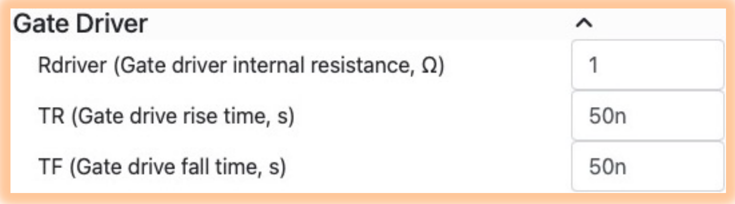
Current Measurement

Rshunt (Ω)	1m
Rshunt Location	RSL



Gate Drive Circuit

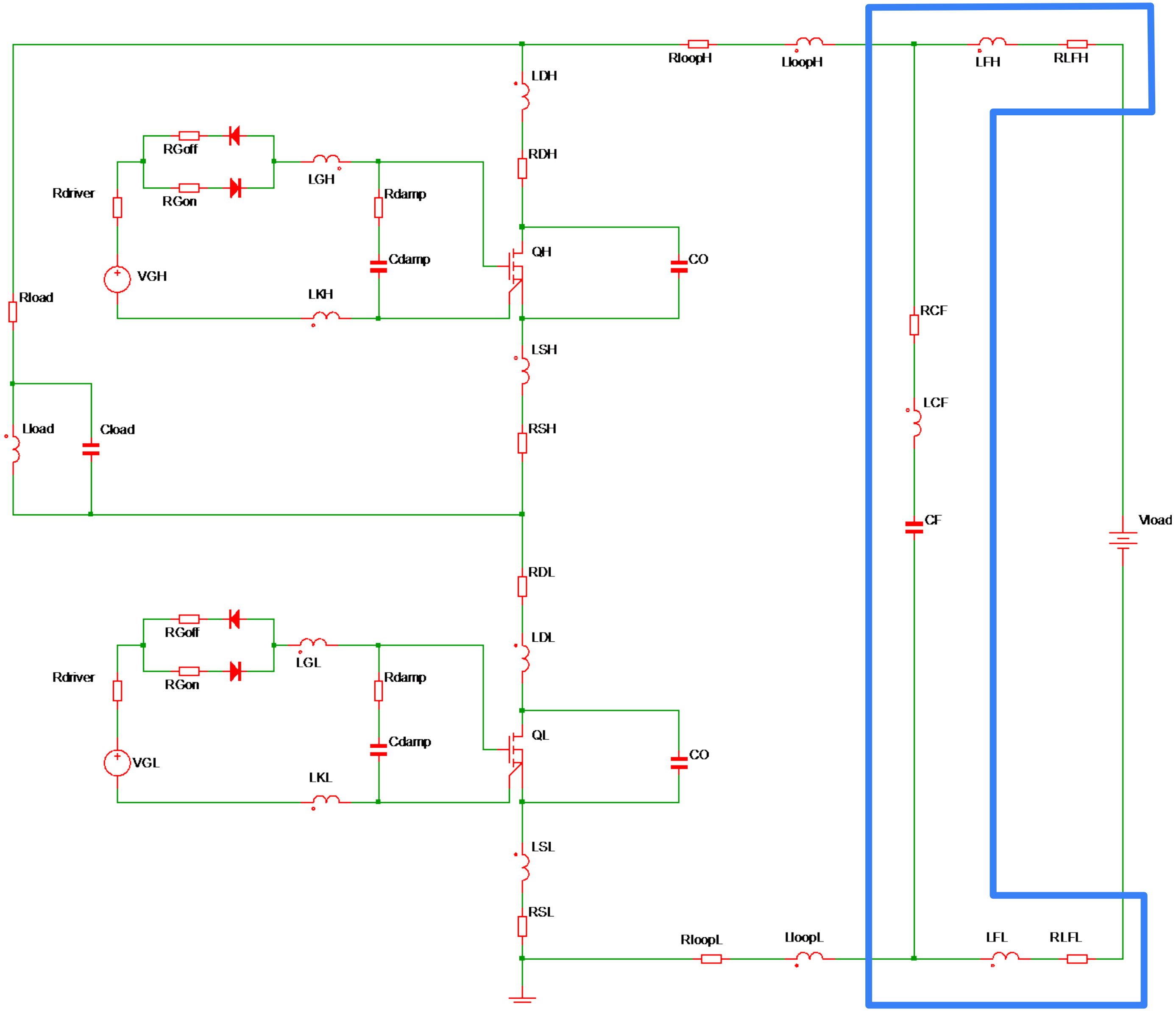
RGoff (Default OFF Gate Resistance, Ω)	2
RGon (Default ON Gate Resistance, Ω)	2
RGoffMIN (Min OFF Gate Resistance, Ω)	2
RGoffMAX (Max OFF Gate Resistance, Ω)	10
RGonMIN (Min ON Gate Resistance, Ω)	2
RGonMAX (Max ON Gate Resistance, Ω)	10
LGH (H)	5n
LKH (H)	5n
LGL (H)	5n
LKL (H)	5n



Gate Driver

Rdriver (Gate driver internal resistance, Ω)	1
TR (Gate drive rise time, s)	50n
TF (Gate drive fall time, s)	50n

Step 5 : Input Filter Parameters



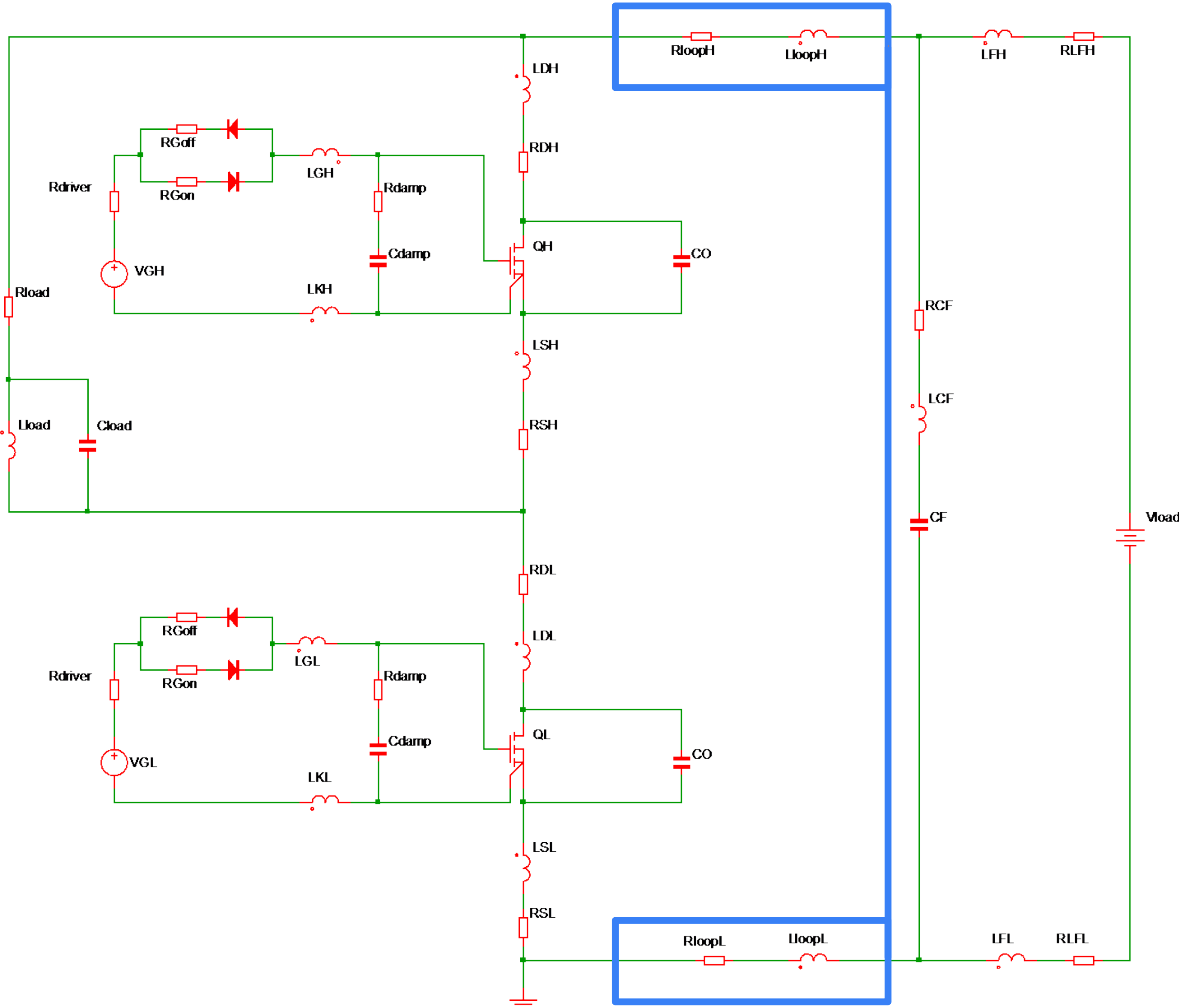

Input Filter

RCF (Ω)	0.2m
LCF (H)	2n
CF (F)	3n
LFH (H)	5n
RLFH (Ω)	0.1m
LFL (H)	5n
RLFL (Ω)	0.1m

LFx (with RLFx as series resistance) is the PCB leakage inductance or a discrete filtering inductor.

The filter capacitor or decoupling capacitor CF includes ESL and ESR parameters.

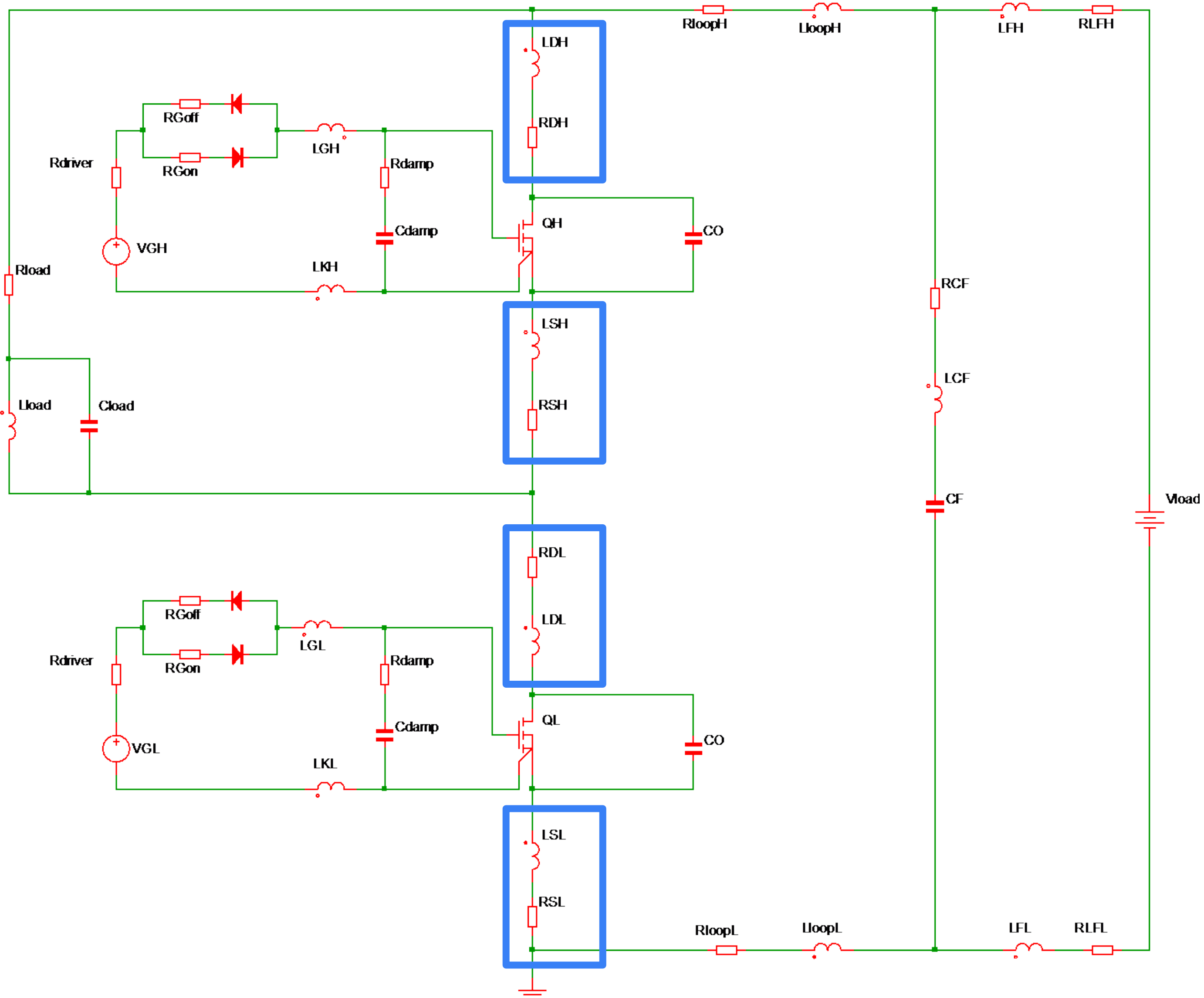
Step 5 : Switching Loop Leakage Inductances

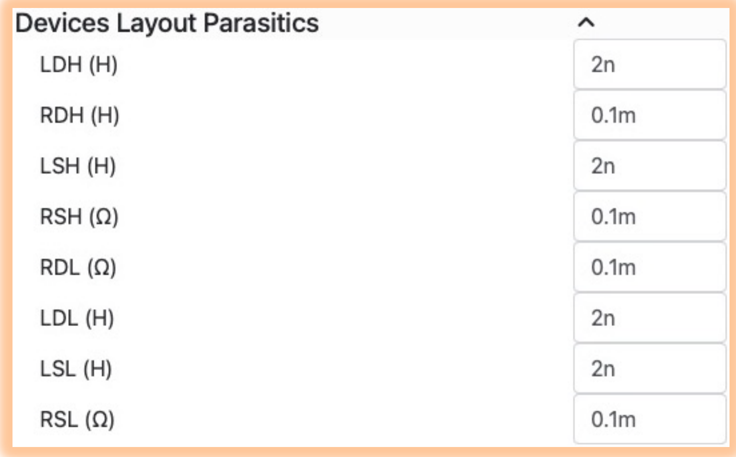


Switching Loop Parasitics	
RloopH (Ω)	0.1m
LloopH (H)	2n
RloopL (Ω)	0.1m
LloopL (H)	2n

The switching loop inductance (in between the decoupling capacitor and the switching cell) is represented by Lloopx (with Rloopx as series resistance) on the positive and negative branch.

Step 5 : Interconnections leakage inductances

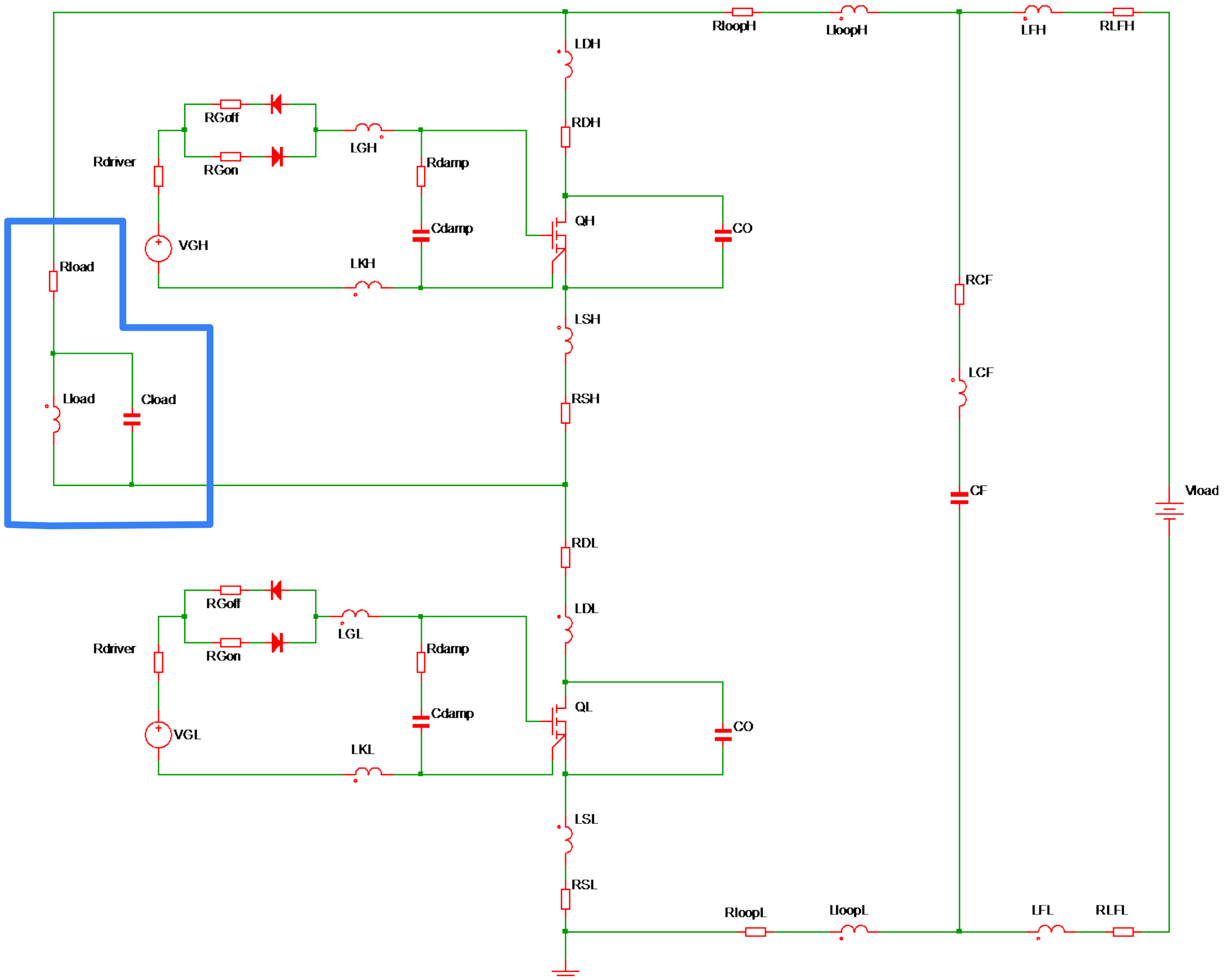


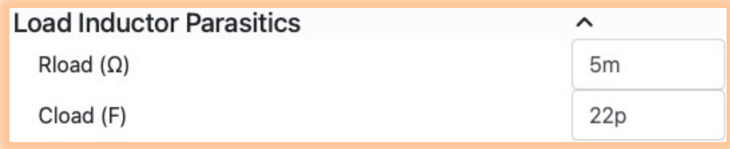

Devices Layout Parasitics

LDH (H)	2n
RDH (H)	0.1m
LSH (H)	2n
RSH (Ω)	0.1m
RDL (Ω)	0.1m
LDL (H)	2n
LSL (H)	2n
RSL (Ω)	0.1m

Drain and Source interconnections can also be modeled by inductances (with series resistances). There are 4 in total for the two switching devices.

Step 5 : Load parameters




Load Inductor Parasitics

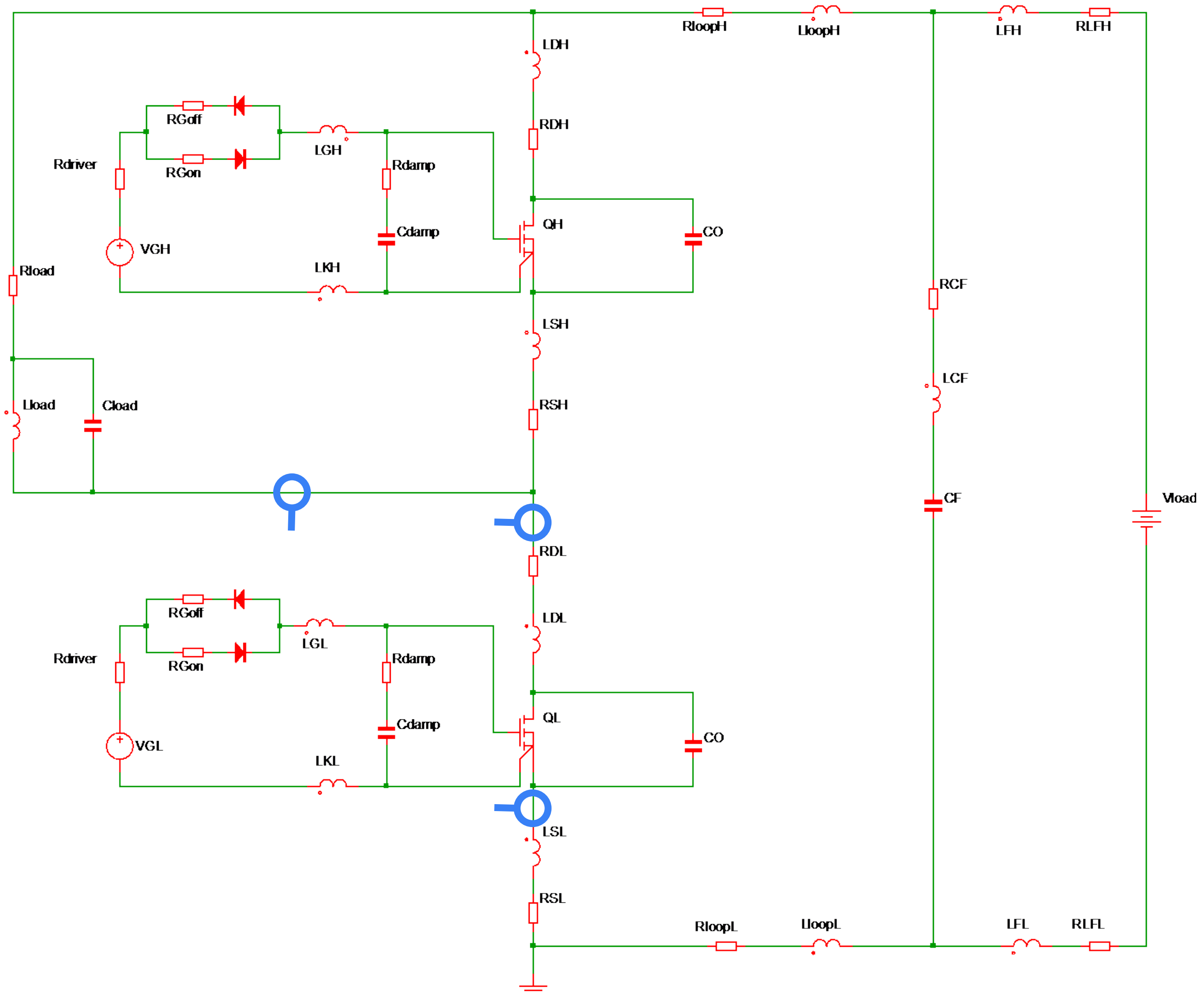
Rload (Ω) 5m

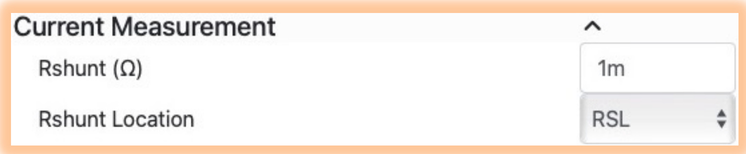
Cload (F) 22p

In hard switching. results are independent of switching or load inductor. Its value is linked to current value and time.

However, the inductor quality or performances can be defined by its equivalent series resistance and its equivalent parallel parasitic capacitor.

Step 5 : Input Filter parameters




Current Measurement

Rshunt (Ω): 1m

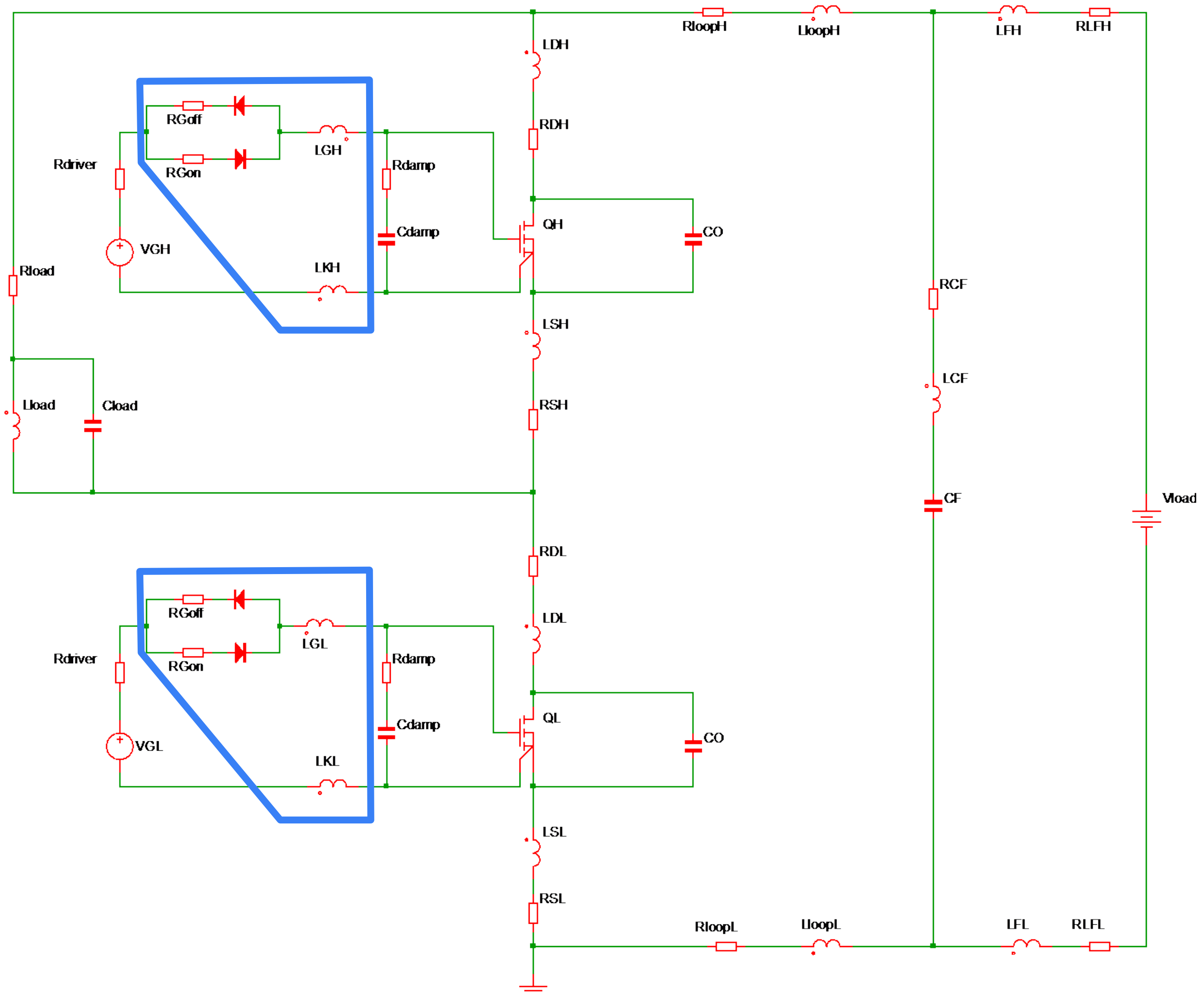
Rshunt Location: RSL

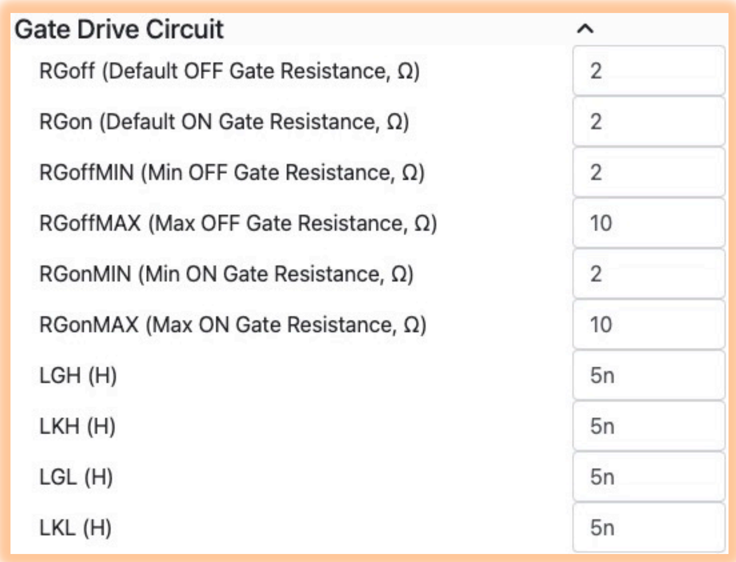
A current sense measurement based on a shunt resistor can be included in the loop in various place :

- in switching device Drain,
- in switching device Source
- in switching inductor

If the shunt is located in the other device drain or source, the interconnection series resistance can be increased accordingly.

Step 5 : Gate Drive Circuit parameters

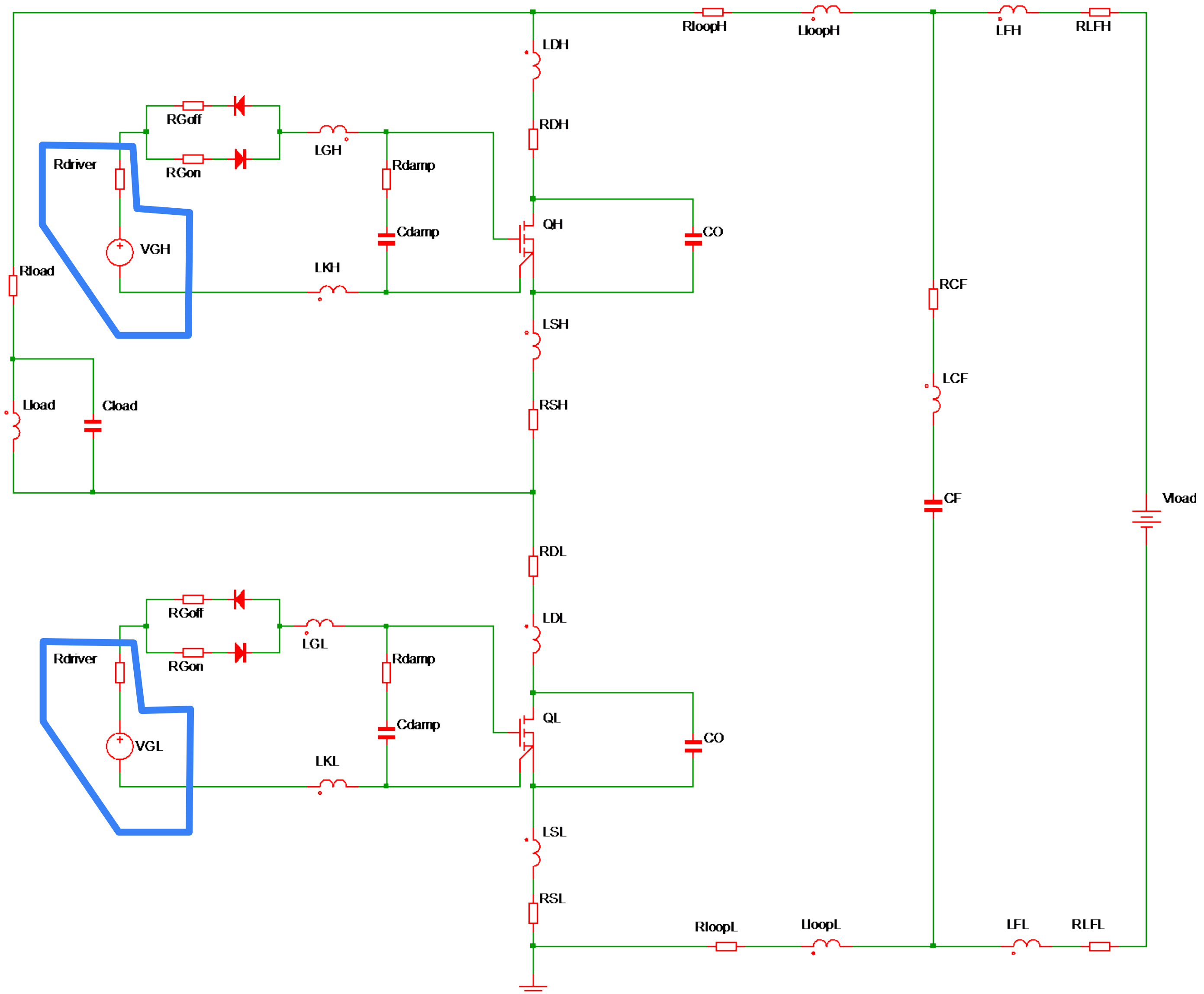


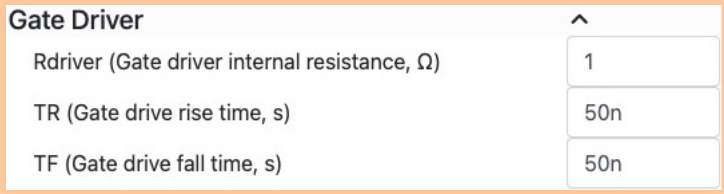

Gate Drive Circuit

RGoff (Default OFF Gate Resistance, Ω)	2
RGon (Default ON Gate Resistance, Ω)	2
RGoffMIN (Min OFF Gate Resistance, Ω)	2
RGoffMAX (Max OFF Gate Resistance, Ω)	10
RGonMIN (Min ON Gate Resistance, Ω)	2
RGonMAX (Max ON Gate Resistance, Ω)	10
LGH (H)	5n
LKH (H)	5n
LGL (H)	5n
LKL (H)	5n

The gate drive circuit includes two parasitic inductances LGx and LKx for interconnection and split gate resistors (RGon and RGoff) to control turn-on and turn-off speed.

Step 5 : Driver extra parameters



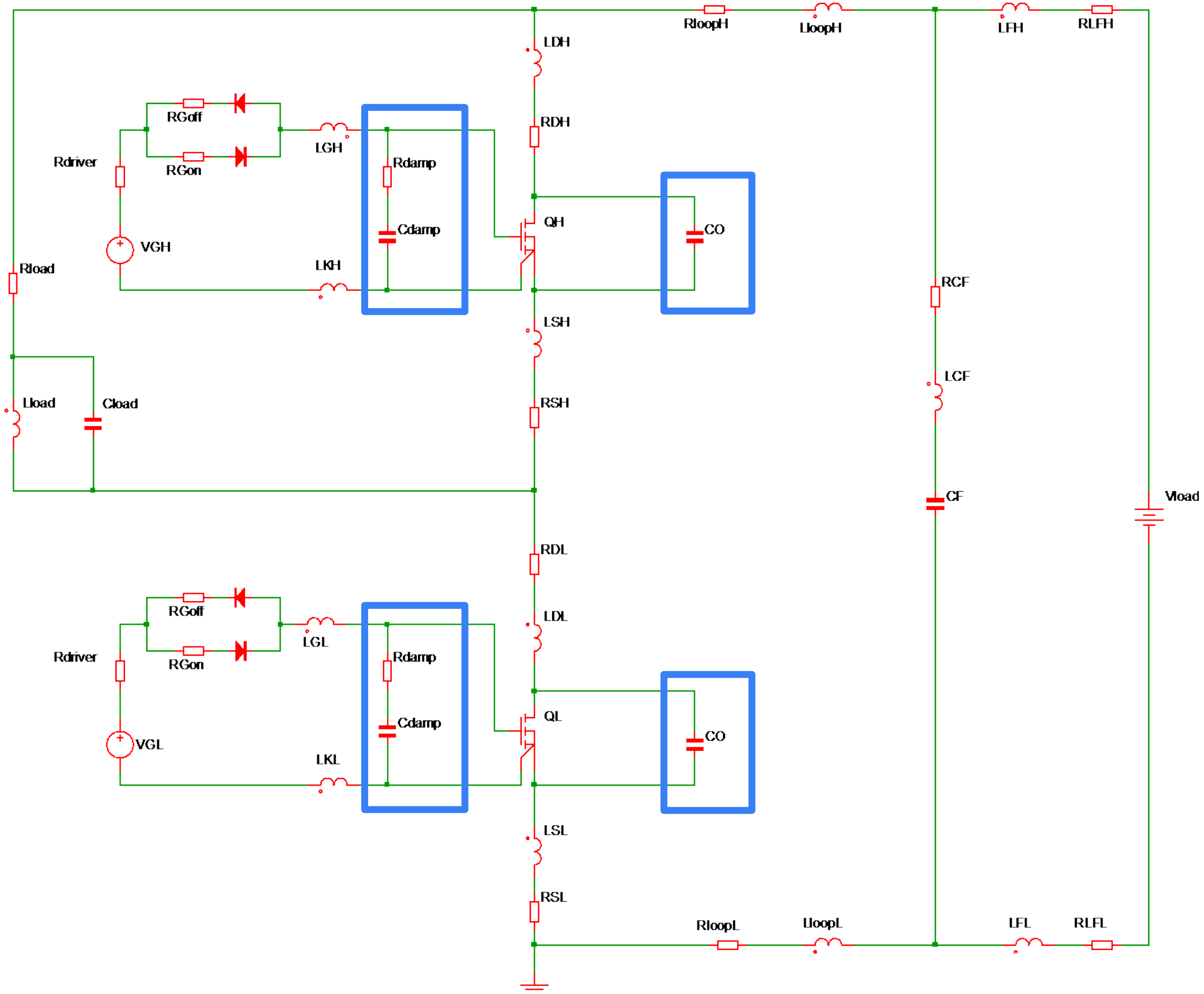

Gate Driver

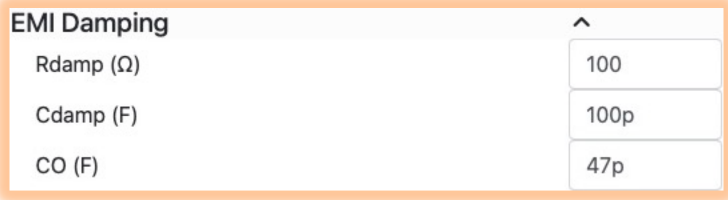
Rdriver (Gate driver internal resistance, Ω)	1
TR (Gate drive rise time, s)	50n
TF (Gate drive fall time, s)	50n

The driver is model by a pulse voltage source with Minimum and Maximum (ON and Off) voltage defined in Step 4.

In Step 5, the user defines the Rise (TR) and Fall (TF) times. The user can also give the driver internal resistance value Rdriver.

Step 5 : EMI Damping parameters




EMI Damping

Rdamp (Ω)	100
Cdamp (F)	100p
CO (F)	47p

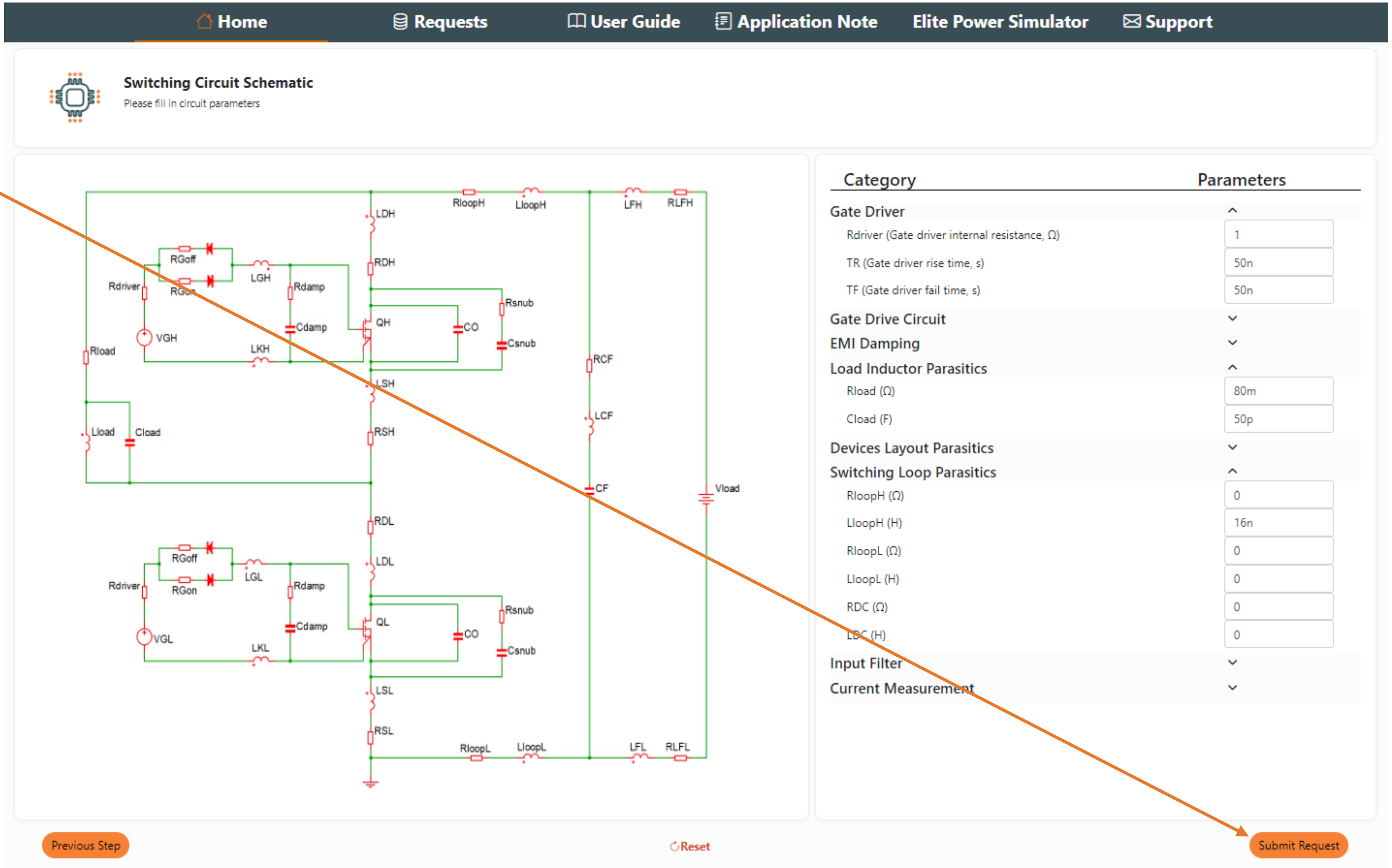
For EMI reduction, two damping circuits can be added.

Between Drain to Source, a parallel capacitor linearizes the switching device output capacitor.

Between Gate and (Kelvin) Source, an R-C series damping network will damp the Miller effect ringing.

Step 6: Submit Request

- From the 5 Circuit Schematic Tab, once all circuit parameters are entered, **Submit Request** button becomes active.
- User clicks on **Submit Request** and is brought to the Request Details page
- Requests take several minutes to complete depending on the density of the input characteristics.
- Modules take longer due to higher complexity compared to discretes.



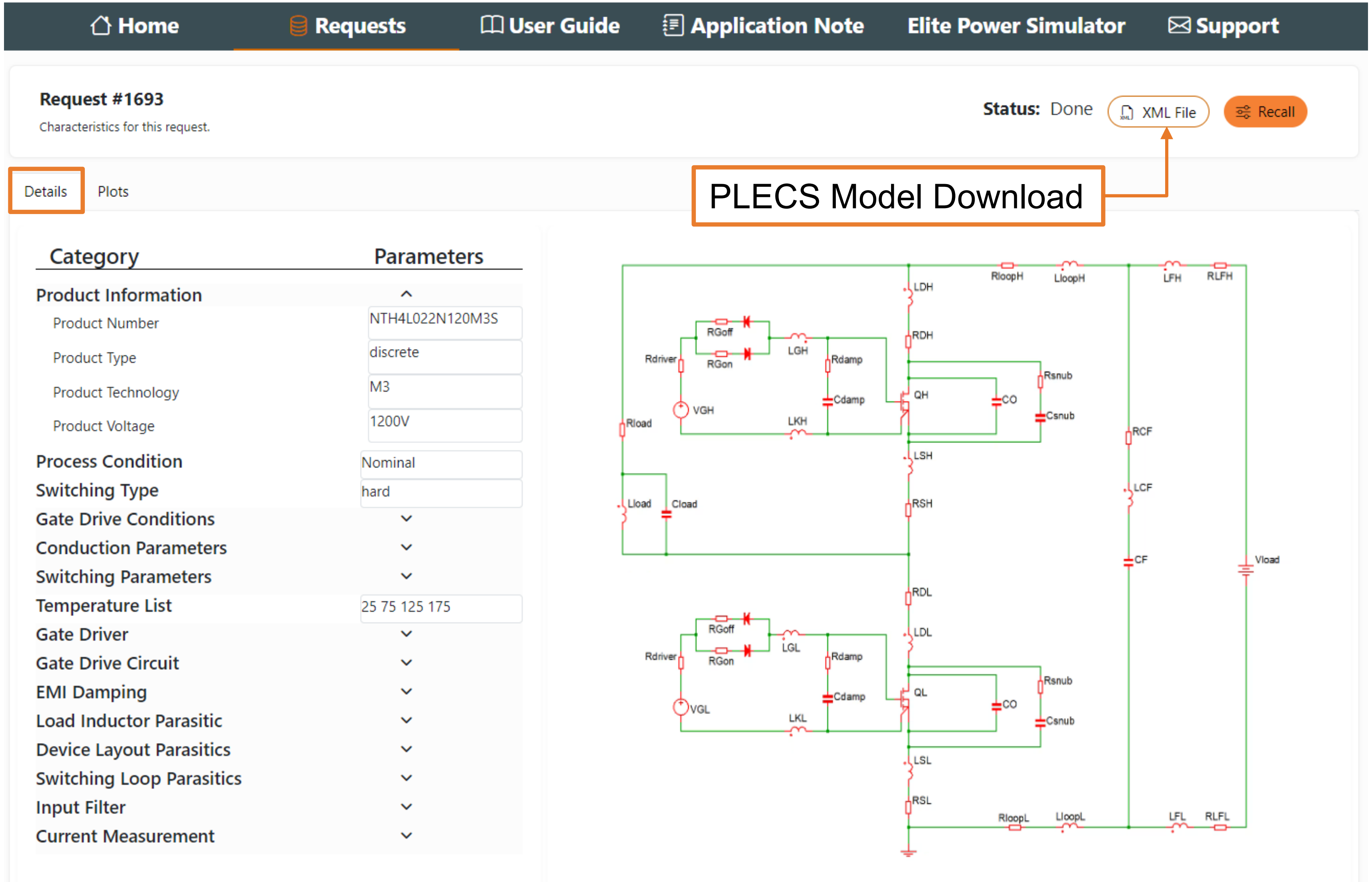
Switching Circuit Schematic

Please fill in circuit parameters

Category	Parameters
Gate Driver	
Rdriver (Gate driver internal resistance, Ω)	1
TR (Gate driver rise time, s)	50n
TF (Gate driver fall time, s)	50n
Gate Drive Circuit	
EMI Damping	
Load Inductor Parasitics	
Rload (Ω)	80m
Cload (F)	50p
Devices Layout Parasitics	
Switching Loop Parasitics	
RloopH (Ω)	0
LloopH (H)	16n
RloopL (Ω)	0
LloopL (H)	0
RDC (Ω)	0
LDC (H)	0
Input Filter	
Current Measurement	

Step 7: Review Request Details Page

- The Request Details page provides user with
  - Details of the input parameters
  - Plots of the simulation results
  - Status field:
    - Pending – simulation in queue
    - Running – simulation running
    - Done – simulation completed
  - PLECS Model (XML File) download
  - Recall button: Enable users to recall the current request into a new request where changes can be made before submitting the new request. The current request is maintained.



Request #1693

Characteristics for this request.

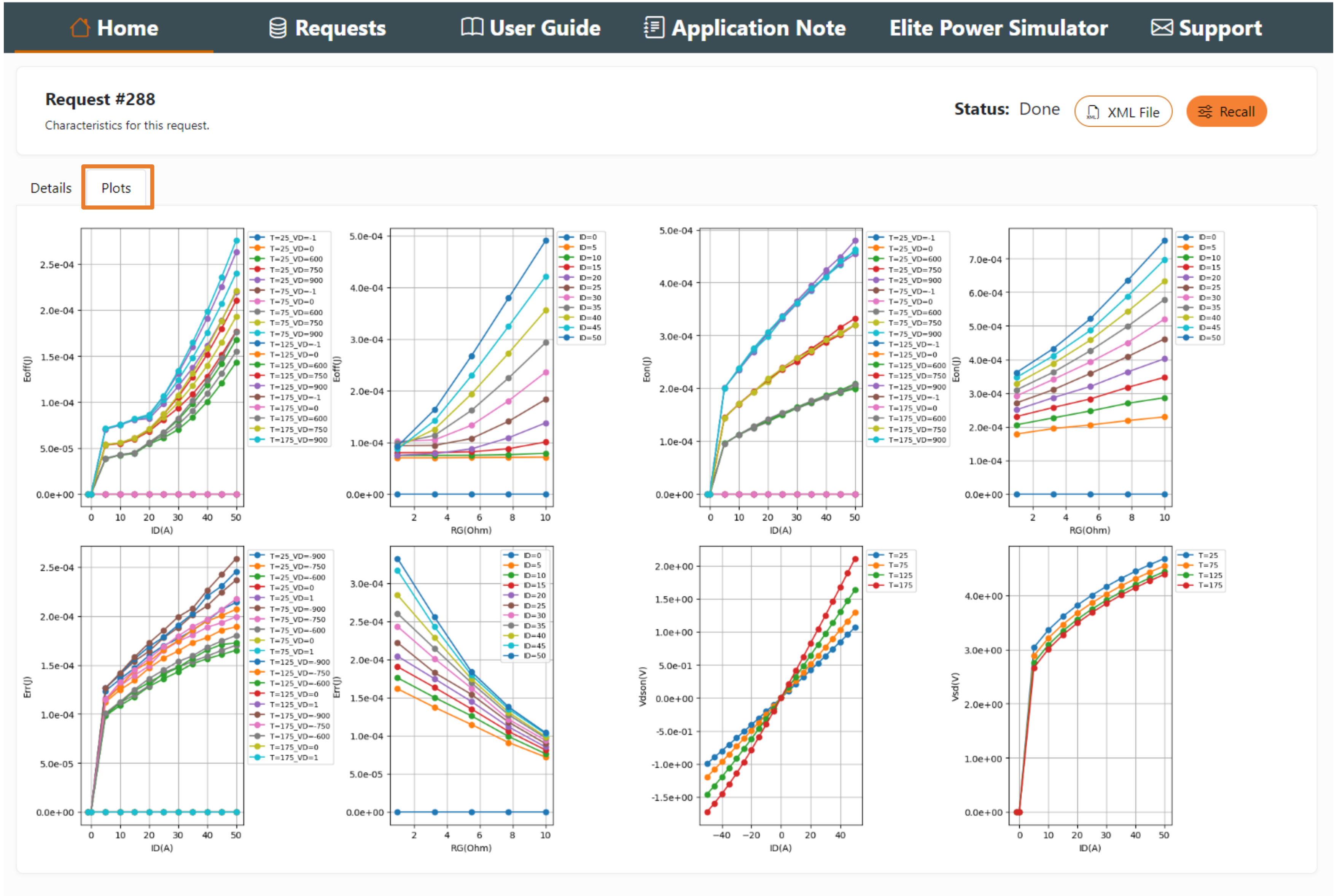
Status: Done

PLECS Model Download

Category	Parameters
Product Information	
Product Number	NTH4L022N120M3S
Product Type	discrete
Product Technology	M3
Product Voltage	1200V
Process Condition	Nominal
Switching Type	hard
Gate Drive Conditions	
Conduction Parameters	
Switching Parameters	
Temperature List	25 75 125 175
Gate Driver	
Gate Drive Circuit	
EMI Damping	
Load Inductor Parasitic	
Device Layout Parasitics	
Switching Loop Parasitics	
Input Filter	
Current Measurement	

Step 7: Review Request Details Page – Plots Tab

- The Plots tab provides users with multiple plots representing the data in the XML file.
  - Eoff, Eon, Err vs. ID (current) for different temperatures and voltage @default RG
  - Eoff, Eon, Err vs. RG for different currents @maximum temperature and voltage.
  - Transistor conduction plot VDSon vs. ID for different temperatures.
  - Diode conduction plot Vsd vs. ID for different temperatures.

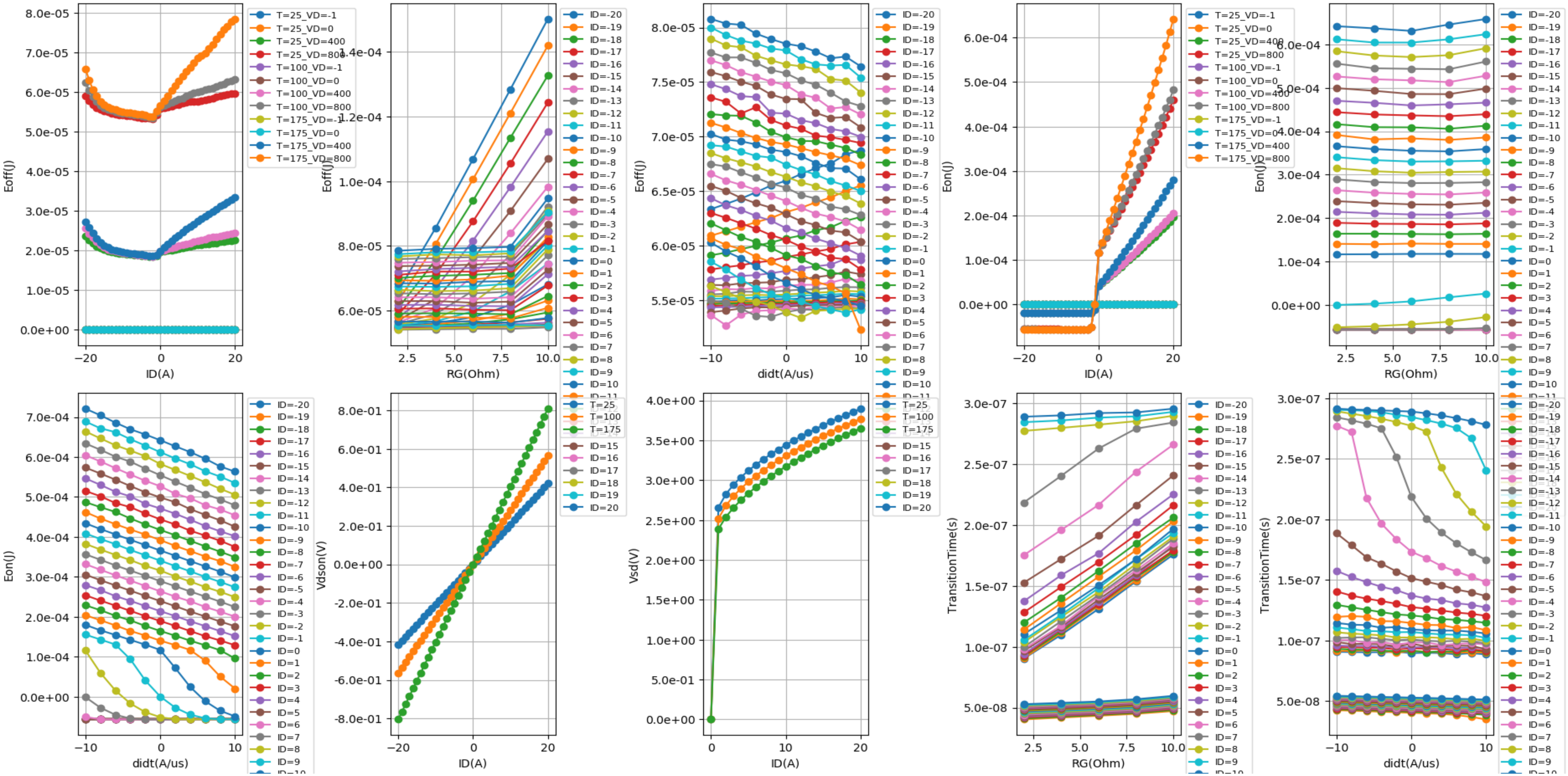


Request #288

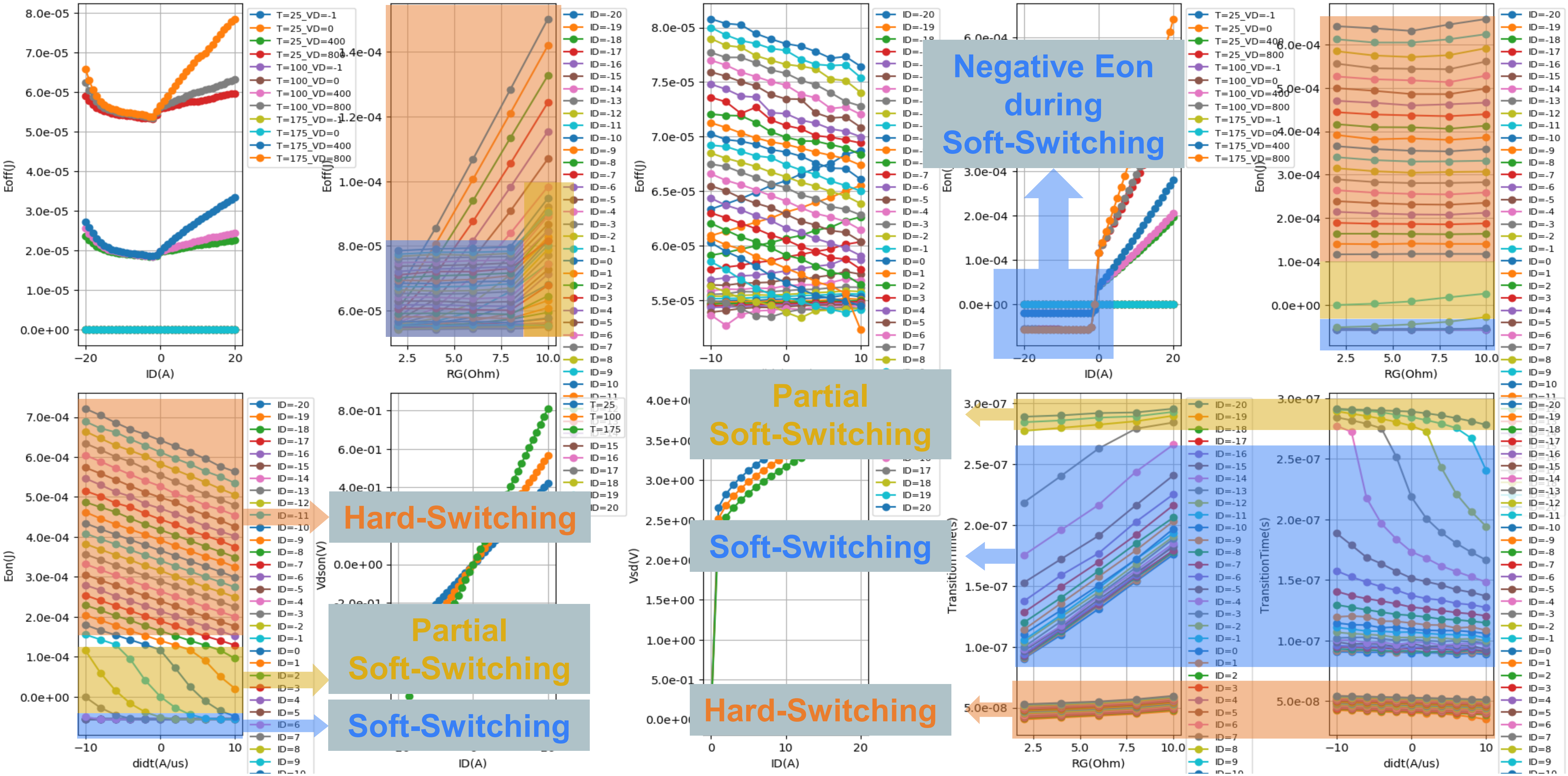
Characteristics for this request.

Status: Done

Example Soft Switching Model Results



Example Soft Switching Model Results



Negative Eon during Soft-Switching

Partial Soft-Switching

Soft-Switching

Hard-Switching

Hard-Switching

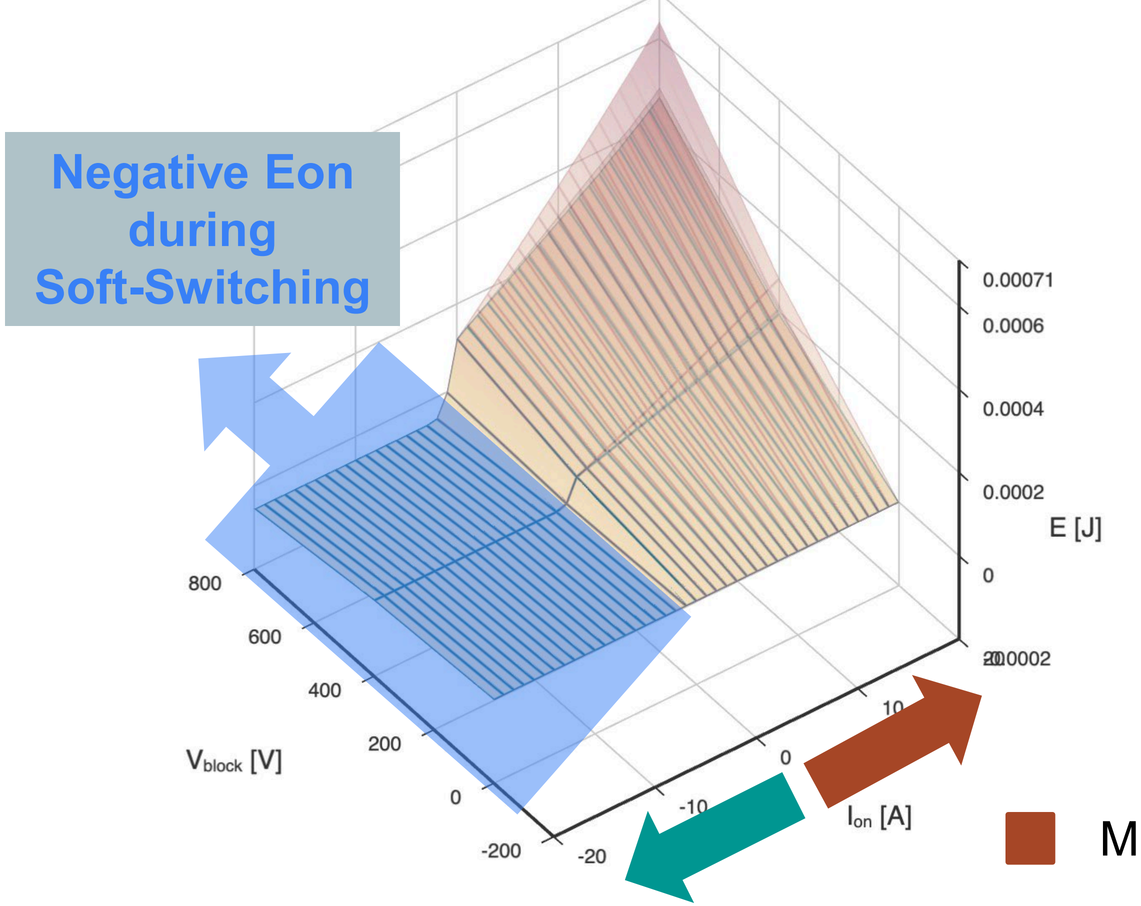
Partial Soft-Switching

Soft-Switching

APEC 2023

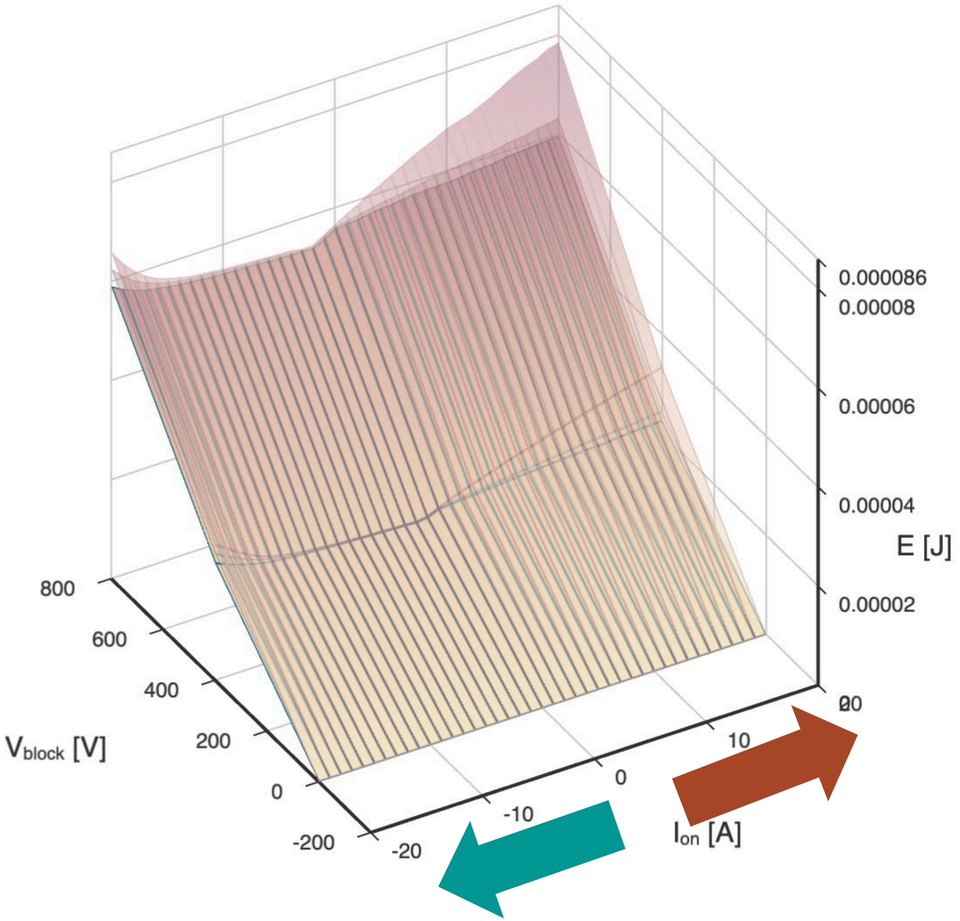
Example Soft Switching Model Results: 3D View

- Eon



Negative Eon during Soft-Switching

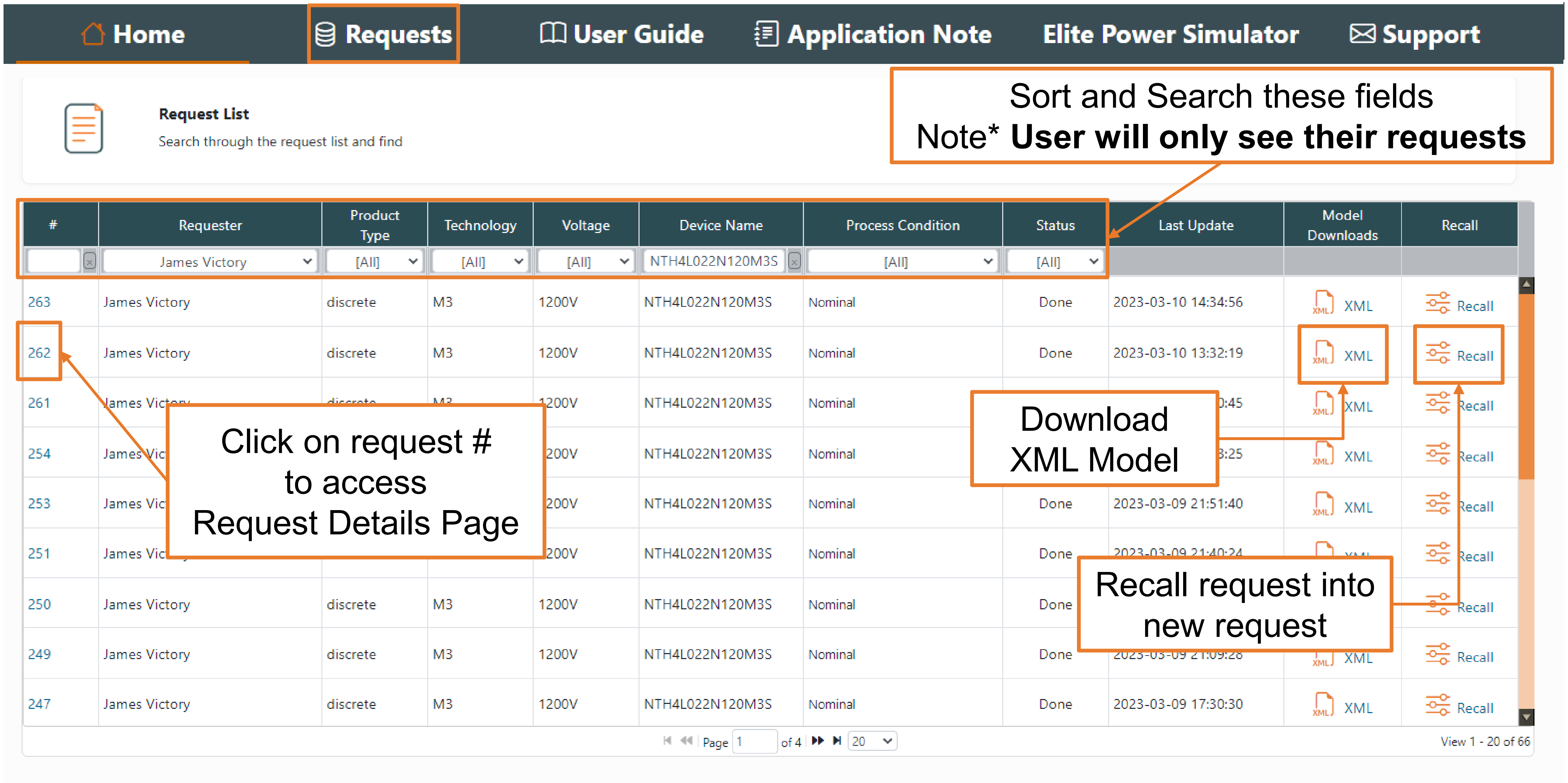
- Eoff



🟥 Main Switch

🟩 Synchronous Rectifier

Step 8: Review Requests Summary Page



Request List

Search through the request list and find

Sort and Search these fields
Note* **User will only see their requests**

#	Requester	Product Type	Technology	Voltage	Device Name	Process Condition	Status	Last Update	Model Downloads	Recall
	James Victory	[All]	[All]	[All]	NTH4L022N120M3S	[All]	[All]			
263	James Victory	discrete	M3	1200V	NTH4L022N120M3S	Nominal	Done	2023-03-10 14:34:56	XML	Recall
262	James Victory	discrete	M3	1200V	NTH4L022N120M3S	Nominal	Done	2023-03-10 13:32:19	XML	Recall
261	James Victory	discrete	M3	1200V	NTH4L022N120M3S	Nominal		0:45	XML	Recall
254	James Vic			200V	NTH4L022N120M3S	Nominal		3:25	XML	Recall
253	James Vic			200V	NTH4L022N120M3S	Nominal	Done	2023-03-09 21:51:40	XML	Recall
251	James Vic			200V	NTH4L022N120M3S	Nominal	Done	2023-03-09 21:40:24		Recall
250	James Victory	discrete	M3	1200V	NTH4L022N120M3S	Nominal	Done			Recall
249	James Victory	discrete	M3	1200V	NTH4L022N120M3S	Nominal	Done	2023-03-09 21:09:28	XML	Recall
247	James Victory	discrete	M3	1200V	NTH4L022N120M3S	Nominal	Done	2023-03-09 17:30:30	XML	Recall

Page 1 of 4 20

View 1 - 20 of 66

Click on request # to access Request Details Page

Download XML Model

Recall request into new request

FAQ: Common Causes of SSPMG Failed Runs

- Very small switching current step (<1A) causing very long simulation times while not really improving the accuracy of the table model.
- Switching currents too close to 0 (<1A). In the EOFF extraction, 1% ID point by IEC standard will yield very small curents which can cause extraction errors due to leakage. For example, when ID=0.1A,the 1%ID will be only 1mA,which could be less than the leakage for some high temparture conditions.
- Switching load voltages are too low. Very low Vload can cause errors in the EON extraction, in which we need to measure 3%VDS by IEC standard.
- Switching load voltage too close to the device breakdown voltage BV can cause issues if there is overshoot of VDS in turn off. If the overshoot is higher than BV, the breakdown current will generate strange behaviors.
- For soft switching, users put very small negative current.. For these inputs, there would be only 1 or 2 points for negative current yielding poor results. There should be at least 3 points in the negative current range.
  - Iswitch_min=-1 Iswitch_max=50 Iswitch_step=5
  - Iswitch_min=-10 Iswitch_max=50 Iswitch_step=5
- Very large dI/dt could cause convergence issues or very strange behavior.
- In general check ranges of parasitics. Unreasonable large inductors, resistors and capacitors can cause issues. For example, large CLOAD/CO could cause very long turn on/off edge.

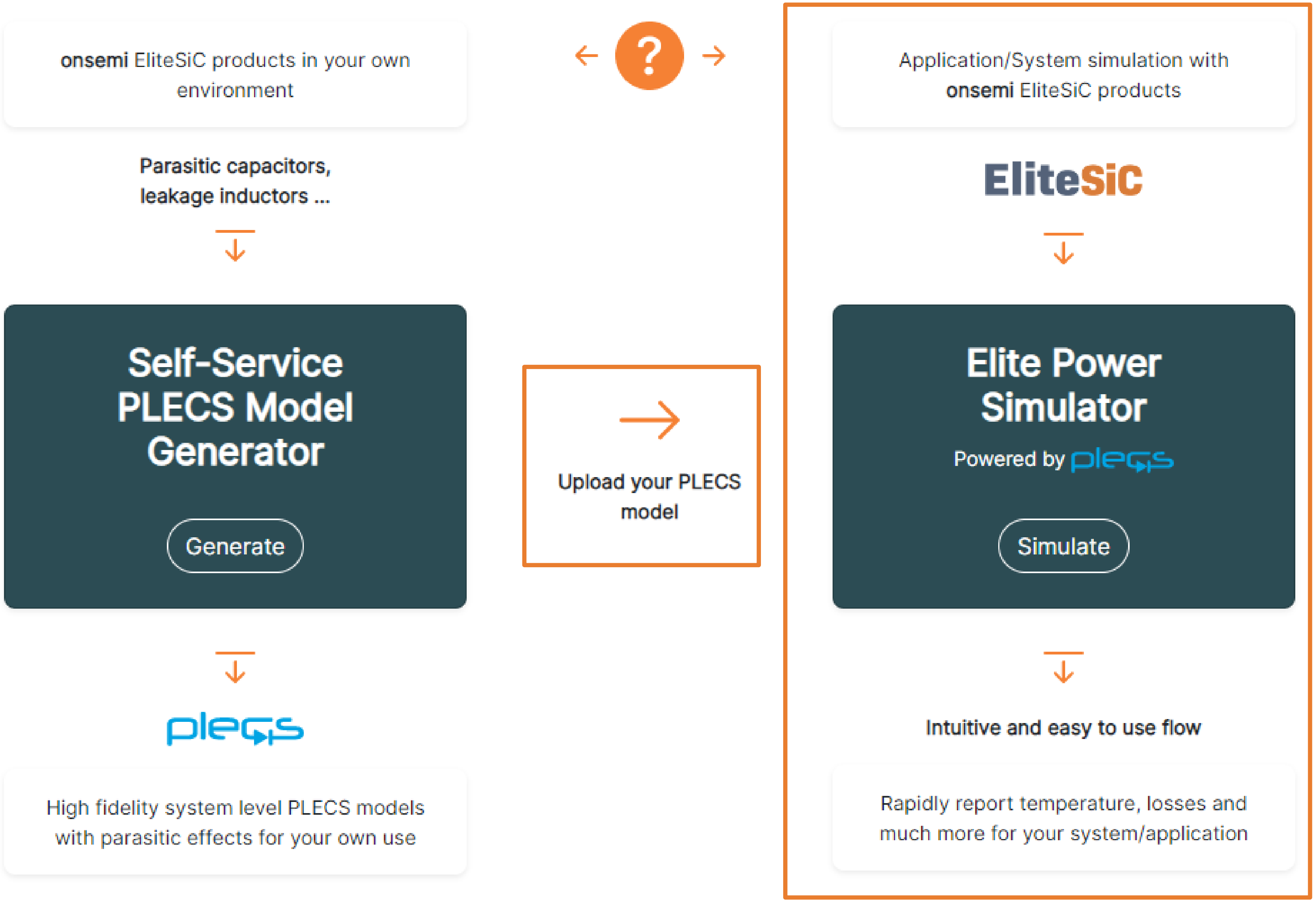
Outline of User Guide

1 Introduction to Self-Service PLECS Model Generator: What is it and What are the benefits

2 Step by Step Tool Flow

3 Deploying PLECS Models in Elite Power Simulator and PLECS Stand Alone

Deploying PLECS Models in Elite Power Simulator



onsemi EliteSiC products in your own environment

Parasitic capacitors, leakage inductors ...

Self-Service PLECS Model Generator

Generate

plecs

High fidelity system level PLECS models with parasitic effects for your own use

?

Upload your PLECS model

Application/System simulation with **onsemi** EliteSiC products

EliteSiC

Elite Power Simulator

Powered by plecs

Simulate

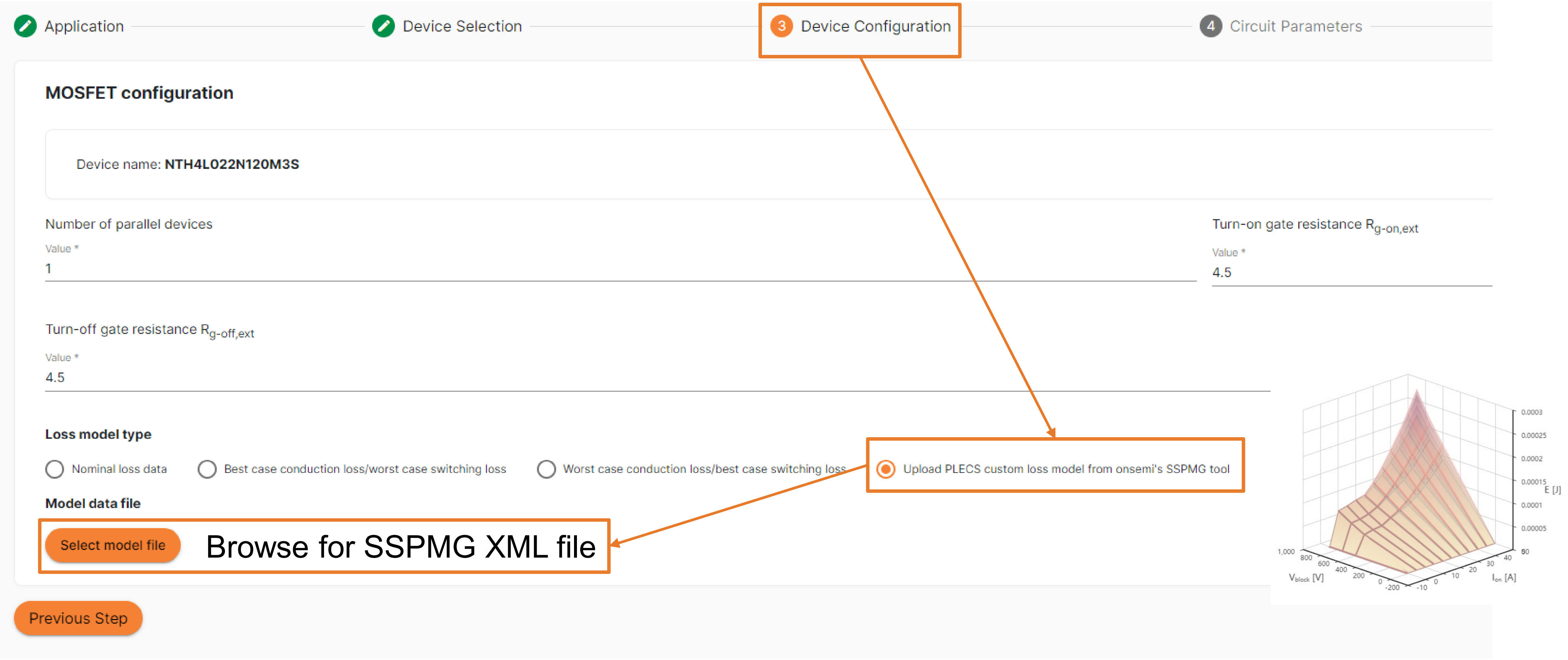
Intuitive and easy to use flow

Rapidly report temperature, losses and much more for your system/application

onsemi

Load SSPMG models into Elite Power Simulator

In Device Configuration Tab, user can select to upload SSPMG generated model



Application — Device Selection — ③ Device Configuration — ④ Circuit Parameters

MOSFET configuration

Device name: **NTH4L022N120M3S**

Number of parallel devices

Value * 1

Turn-on gate resistance $R_{g\text{-on,ext}}$

Value * 4.5

Turn-off gate resistance $R_{g\text{-off,ext}}$

Value * 4.5

Loss model type

○ Nominal loss data ○ Best case conduction loss/worst case switching loss ○ Worst case conduction loss/best case switching loss ● Upload PLECS custom loss model from onsemi's SSPMG tool

Model data file

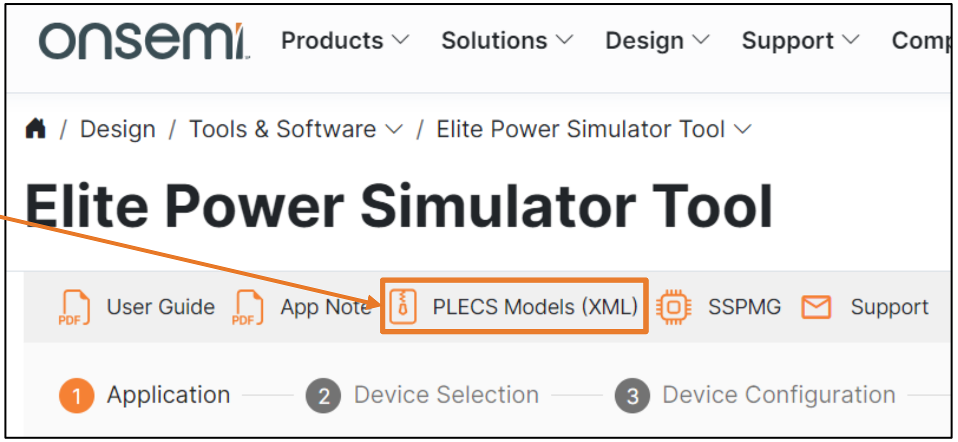
Select model file

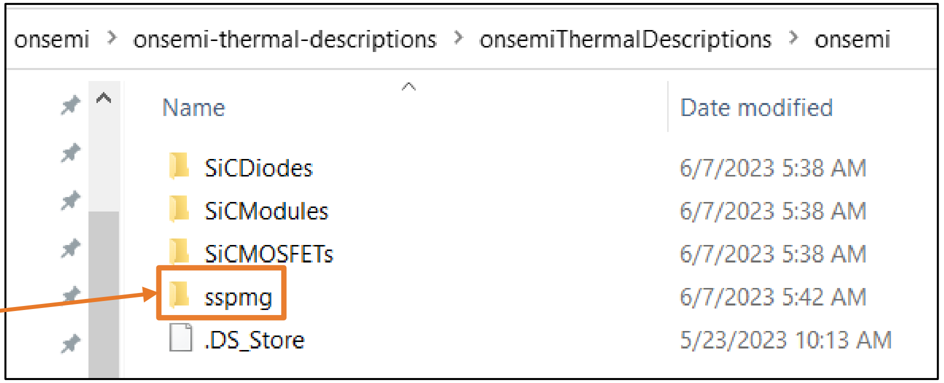
Browse for SSPMG XML file

Previous Step

Load SSPMG models into PLECS Stand Alone

- First download PLECS models from Elite Power Simulator and follow instructions in "Install.txt" file.
  - *To install the onsemi SiC library components and corresponding thermal descriptions (XML files), simply add this directory (containing the "onsemiThermalDescriptions/" folder, "onsemiComponentLibrary_public.plecs" PLECS model, and "info.xml" file) into the list of thermal description search paths in the Thermal tab of the PLECS Preferences window. Click the Refresh button on the left side of the list and click OK to load the onsemi files into PLECS. Then a new entry in the PLECS Library Browser should appear "onsemi Block Library" containing several components that can be dragged into your own circuit models and directly be used with the provided thermal descriptions.*
- Create subfolder sspmg here and place SSPMG XML files in this directory. Note folder can be any name.

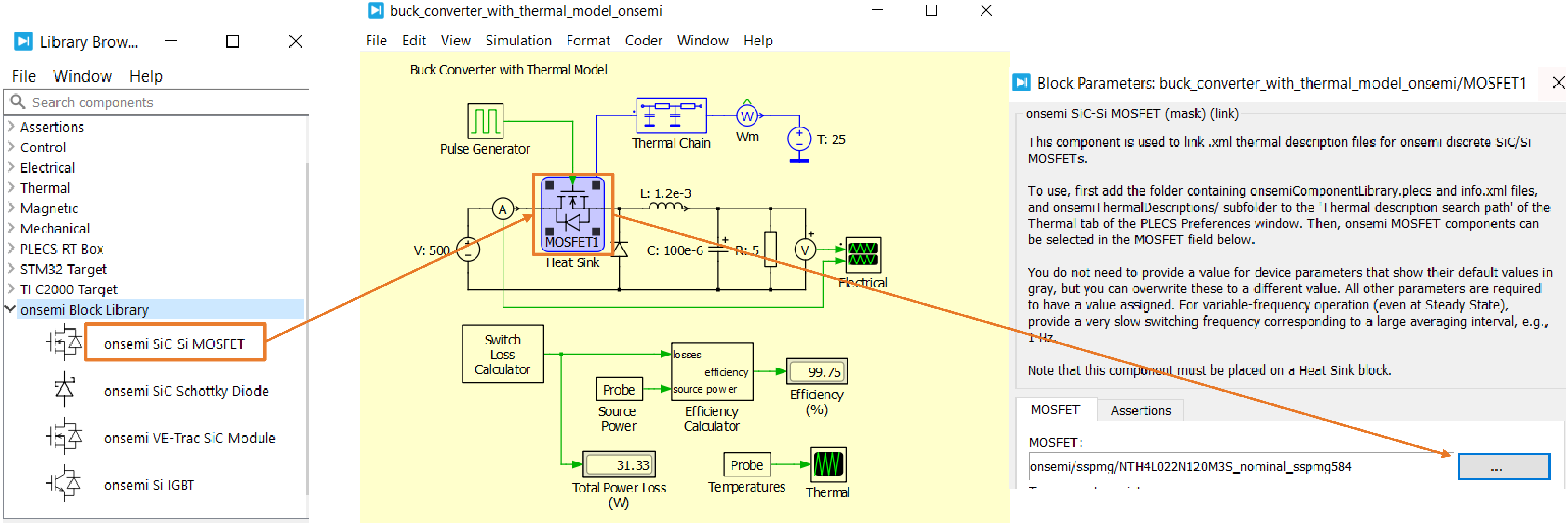



onsemi › onsemi-thermal-descriptions › onsemiThermalDescriptions › onsemi

Name	Date modified
SiCDiodes	6/7/2023 5:38 AM
SiCModules	6/7/2023 5:38 AM
SiCMOSFETs	6/7/2023 5:38 AM
sspmg	6/7/2023 5:42 AM
.DS_Store	5/23/2023 10:13 AM

Load SSPMG models into PLECS Stand Alone

- Place an onsemi SiC-Si MOSFET or Si IGBT in PLECS schematic.
- Double click MOSFET/IGBT symbol and browse for SSPMG XML file.



onsemi SiC-Si MOSFET (mask) (link)

This component is used to link .xml thermal description files for onsemi discrete SiC/Si MOSFETs.

To use, first add the folder containing onsemiComponentLibrary.plecs and info.xml files, and onsemiThermalDescriptions/ subfolder to the 'Thermal description search path' of the Thermal tab of the PLECS Preferences window. Then, onsemi MOSFET components can be selected in the MOSFET field below.

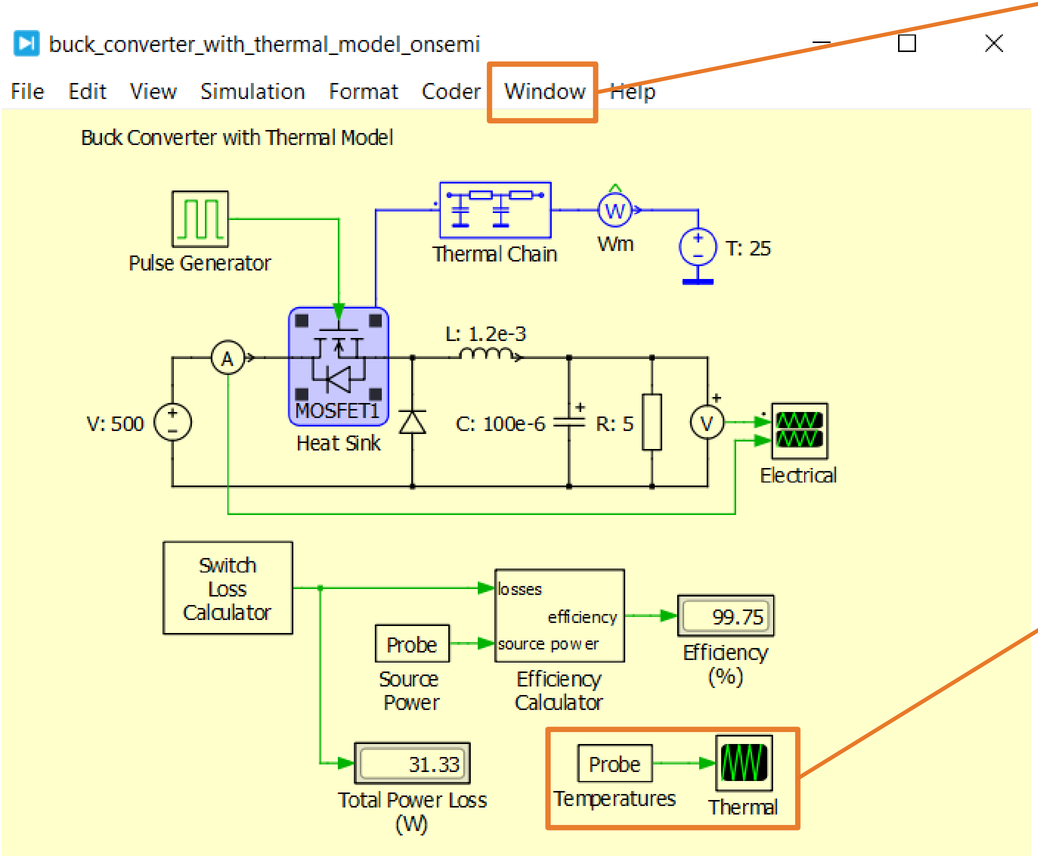
You do not need to provide a value for device parameters that show their default values in gray, but you can overwrite these to a different value. All other parameters are required to have a value assigned. For variable-frequency operation (even at Steady State), provide a very slow switching frequency corresponding to a large averaging interval, e.g., 1 Hz.

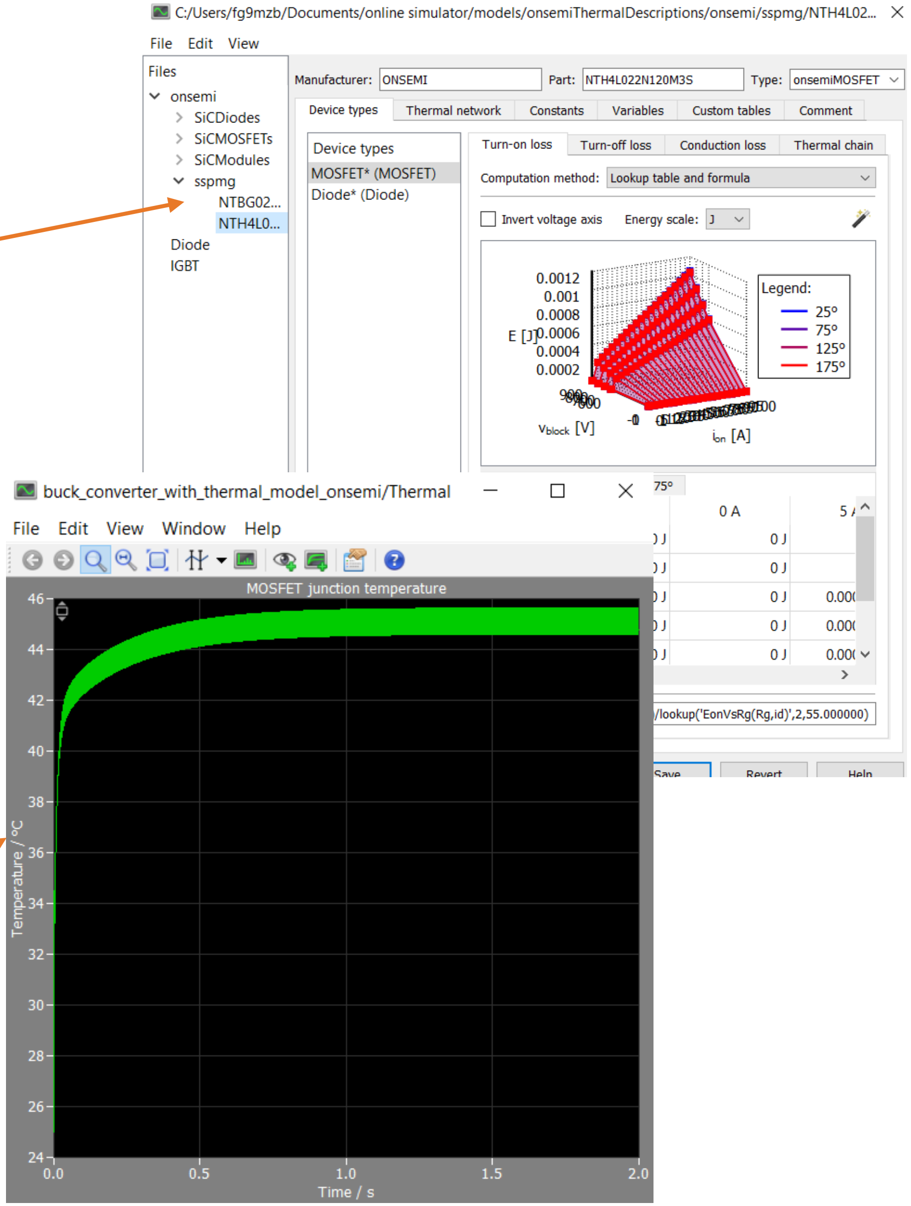
Note that this component must be placed on a Heat Sink block.

MOSFET: onsemi/sspmg/NTH4L022N120M3S_nominal_sspmg584

Load SSPMG models into PLECS Stand Alone

- Review XML data under Window →Thermal Library Browser
- Run simulation





Manufacturer: ONSEMI

Part: NTH4L022N120M3S

Type: onsemiMOSFET

Computation method: Lookup table and formula

☐ Invert voltage axis

Energy scale: J

/lookup('EonVsRg(Rg,id)',2,55.000000)

Questions?

Have questions, comments, or need support with your Self-Service PLECS Model Generator needs? We're here to help! Write us an email at **sspmg@onsemi.com**.

- Self-Service PLECS Model Generator:

  www.onsemi.com/self-plecs-generator

- Elite Power Simulator:

  www.onsemi.com/elite-power-simulator

onsemi™

Intelligent Technology. Better Future.

Follow Us @onsemi

www.onsemi.com