



life.augmented

# eDesignSuite와 eDSim을 활용한 DC-DC 컨버터 설계 Leading the innovation of Design tools

ST PDSA Korea

권경희 대리

System SW Tools to support engineers in multiple stages of their system design effort through a compelling, coherent and engaging user experience



More **accurate**, more **reliable** and more **intuitive** design process



Improved **user experience** with multilanguage console



**Clever user interactions:** reworked engine, optimized algorithms, improved portability

# eDesignSuite: evolution to a full system design tool

Power Management Design Center

## Power Supply Design Tool

DC/DC AC/DC Power Tree Solar Battery Charger

**NEW** eDSim **STI**

**NEW** Ultra Librarian

**NEW** Evaluation Board/s

## LED Lighting Design Tool

DC/DC AC/DC

**NEW** Ultra Librarian

**NEW** Evaluation Board/s

## Digital Power Workbench



Thermal-Electrical Simulators for components

AC Switches Simulator Rectifier Diodes Simulator TVS Simulator

**NEW** ST PROTECT

STPOWER Studio

Signal Conditioning Design Tools

Active Filters Comparators Current Sensing

NFC/RFID Calculators

NFC Inductance UHF Link Budget NFC Tuning Circuit

**NEW**

**NEW**

Specify

Select

Analyze

Refine

Simulate

Prototype

# Streamline your design process

1

Specify the application use-case

	Non Isolated	Buck, Multi-Output Buck, Boost, Buck-Boost
	Isolated	Buck, LLC
	Non Isolated	Buck, FF-Flyback, PFC Pre-Regulation
	Isolated	FF-Flyback, QR-Flyback, PWM Controllers

2

Select among the suggested ICs, the ones with specific features

3

Analyze time and frequency domain results, efficiency and losses

4

Refine the specifications of the project

5

Simulate the circuit with the fast and powerful eDSim tool

6

Export the OrCAD file to start the Prototyping phase

# eDesign Suite – how to find

- Go to [st.com/edesignsuite](https://www.st.com/edesignsuite)
- or
- From **st.com** go to
  - Tools & Software -> Calculators, Simulators, Selectors -> eDesign Suite

The image displays two screenshots of the STMicroelectronics website. The left screenshot shows the navigation menu with 'Tools & Software' selected, and a sub-menu where 'Calculators, Selectors, Simulators' and 'eDesign Suite' are highlighted. The right screenshot shows the 'eDesign Suite' landing page, which includes a 'Start Design' button highlighted in a pink box. A blue arrow points from the first bullet point to the right screenshot, and a pink arrow points from the 'eDesign Suite' link in the left screenshot to the 'Start Design' button in the right screenshot.

# Select Product

The screenshot displays the ST eDesignSuite interface. At the top left is the ST logo with the text "life.augmented". In the center is the "eDesignSuite" logo. At the top right, there is a language selector set to "English" and a "Help" button. Below the header is a navigation bar with "Tools" and "Dashboard" menus. The main content area is titled "Power Supply Design Tools > DC/DC" and shows "1 Results". On the left, a "Specifications" panel contains input and output fields with error messages: "Vin min is required", "Vin max is required", "Vout is required", and "Iout is required". A search bar at the top right of the results area contains the text "L6983C50QTR". The search results show a product card for "L6983C50QTR Buck" with a circuit diagram, technical specifications (Vin: 5 - 38 V, Vout: 5 V, Iout: ≤ 3 A, fosc: 400 kHz (200 - 2300 kHz), fsync: none), a QFN16 package image, and links for "Datasheet" and "Product Folder". A "START DESIGN" button is also visible. At the bottom left, a blue button indicates "52 MATCHING BOARD/S".

Search L6983C50QTR

# Sett Condition

- Input 20V-30V & Output 5V/1A → Start Design

**L6983C50QTR Buck**

Specifications [Reset All](#)

Input (Voltage)	Min V	Max V
	20	30

Output	Voltage	Current
	5	1

Output Power 5 W

**START DESIGN** ▾

8 MATCHING BOARD/S  
2 ADDITIONAL BOARD/S

# All circuit parameters at a glance

Full set of commands

Fully annotated & interactive schematic

Project specifications

Operating conditions

The screenshot displays a comprehensive circuit design tool interface for an L6983C50QTR DC/DC converter. The central schematic shows the IC with various pins connected to a network of capacitors (C<sub>IN</sub>, C<sub>INB</sub>, C<sub>INB</sub>, C<sub>INB</sub>, C<sub>BOOT</sub>, C<sub>OUT</sub>), an inductor (L), and resistors (R<sub>FILT</sub>). The interface is divided into several functional areas:

- DC/DC CONVERTER SPECIFICATIONS:**
  - IC: L6983C50QTR
  - Topology: BUCK
  - Input: 20 - 30 V
  - Output: 5 V (2% ripple) - 1 A max
  - Buttons: CHANGE SPECIFICATIONS, 8 RECOMMENDED BOARD/S, 2 OTHER SUGGESTIONS
- OPERATING CONDITIONS:**
  - min 20 V / max 30 V
  - @Vin: 30 V
  - min 1 mA / max 1 A
  - @Iout: 1 A
  - min -40 °C / max 150 °C
  - @Ta: 25 °C
- Circuit - BOM:**

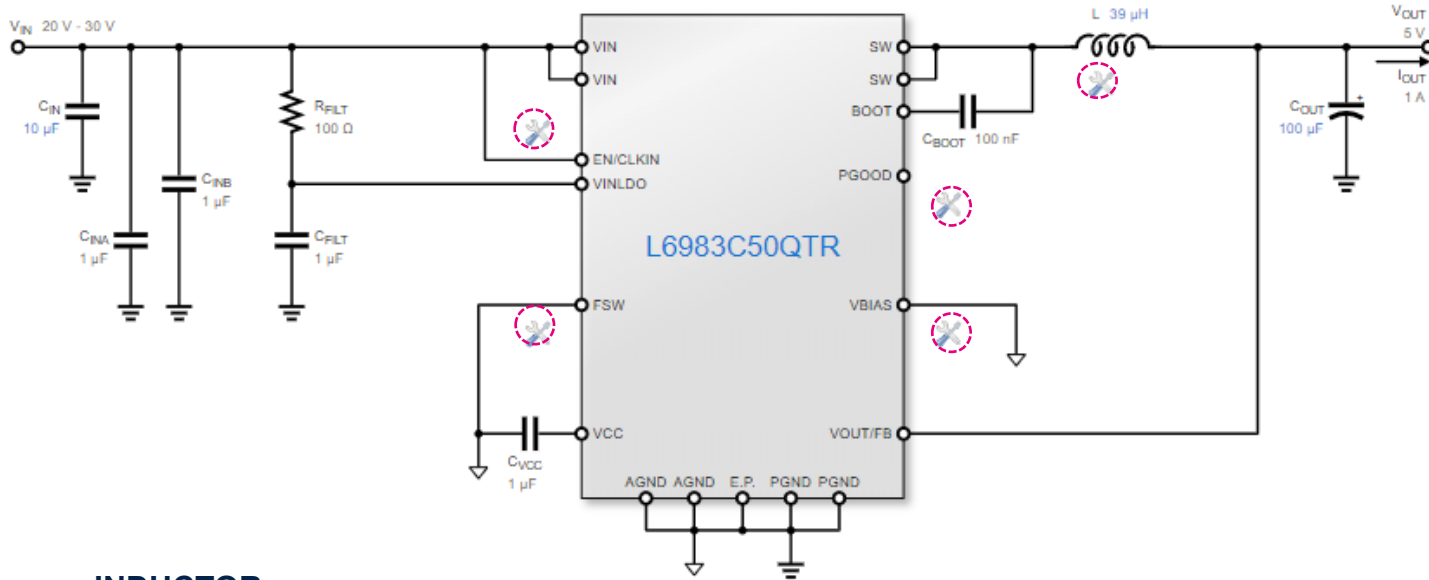
Type	Ref	Value	Description
IC	IC	L6983C50QTR	L6983C50QTR - QFN16 - ...
Capacitor	Cin	10 µF	50 V - 10% - muRata - GR...
Capacitor	Cout	100 µF	6.3 V - 20% - Sanyo - 6CE...
Inductor	L	39 µH	2.74 A - Würth Elektroni...
Capacitor	Cvcc	1 µF	1 µF
Resistor	Rfilt	100 Ω	100 Ω
Capacitor	Cfilt	1 µF	1 µF
Capacitor	Cboot	100 nF	100 nF
Capacitor	CinA	1 µF	1 µF
Capacitor	CinB	1 µF	1 µF
- ACTUALS:**
  - Vout: 5 V
  - ripple: 15 mV - 0.29 %
  - IL ripple: 273 mA - 27.3 % of 1 A
  - fsw: 400 kHz
  - Ton: 429.17 ns
  - Vin ripple: 0.34 %
  - bandwidth: 17.92 kHz
  - phase margin: 62°
  - IC Tj: 39.6 °C
  - ΔTj: 14.6 °C
  - conduction mode: continuous
- Simulation: duty cycle 17.2 %:** A graph showing Voltage (V) and Current (A) over Time (µs).
- Efficiency: 92.2 %:** A graph showing Efficiency (%) vs Output Current (A).
- Bode: fc = 17.92 kHz - phase margin = 62°:** A graph showing Magnitude (dB) and Phase (deg) vs Frequency (Hz).
- Losses: 422 mW - 7.78 %:** A bar chart showing power losses for IC (364 mW - 86.36%), Inductor (57 mW - 13.59%), and Other (0 mW - 0.05%).

Fully annotated and interactive BOM

Full set of analysis diagrams

# Interactive dashboard for refinement and custom components

Circuit - Schematic



Circuit - BOM



Type	Ref	Value	Description
IC	IC	L6983C50QTR	L6983C50QTR - ...
Capacitor	Cin	10 µF	50 V - 10% - mu...
Capacitor	Cout	100 µF	6.3 V - 20% - Sa...
Inductor	L	39 µH	2.74 A - Würth E...
Capacitor	Cvcc	1 µF	
Resistor	Rfilt	100 Ω	
Capacitor	Cfilt	1 µF	
Capacitor	Cboot	100 nF	
Capacitor	CinA	1 µF	
Capacitor	CinB	1 µF	



## INTERACTIVE DASHBOARD

The user can refine sections of the circuit (clamer net, passive components, compensation net, MOSFETs, diodes, etc)

### INDUCTOR

You can select inductor with real spec.

**L6983C50QTR BUCK Design Wizard**

<p><a href="#">IO SPECIFICATION</a></p> <p><a href="#">ADDITIONAL REQUIREMENTS</a></p> <p><b><a href="#">INDUCTOR SELECTION</a></b></p> <p><a href="#">INPUT CAPACITOR</a></p> <p><a href="#">OUTPUT CAPACITOR</a></p>	<p><b>INDUCTOR SELECTION</b></p> <p>AUTOSELECTED <span style="float: right; border: 1px solid black; padding: 2px 5px;">REPLACE</span></p> <p>Part Number: 744771139</p> <p>Manufacturer: Würth Elektronik</p> <p>Value: 39 µH</p> <p>DCR: 57 mΩ</p> <p>Irms: 2.49 A</p> <p>Isat: 2.74 A</p> <p>Mount Type: Surface Mount</p>
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# Your design gets portable and exportable



## Save

Save your project on ST server, you can open it from any machine: your design gets portable!

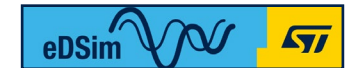


## Export

Export the schematic and Bill of Material



Export the OrCAD file of your project to start the prototyping phase



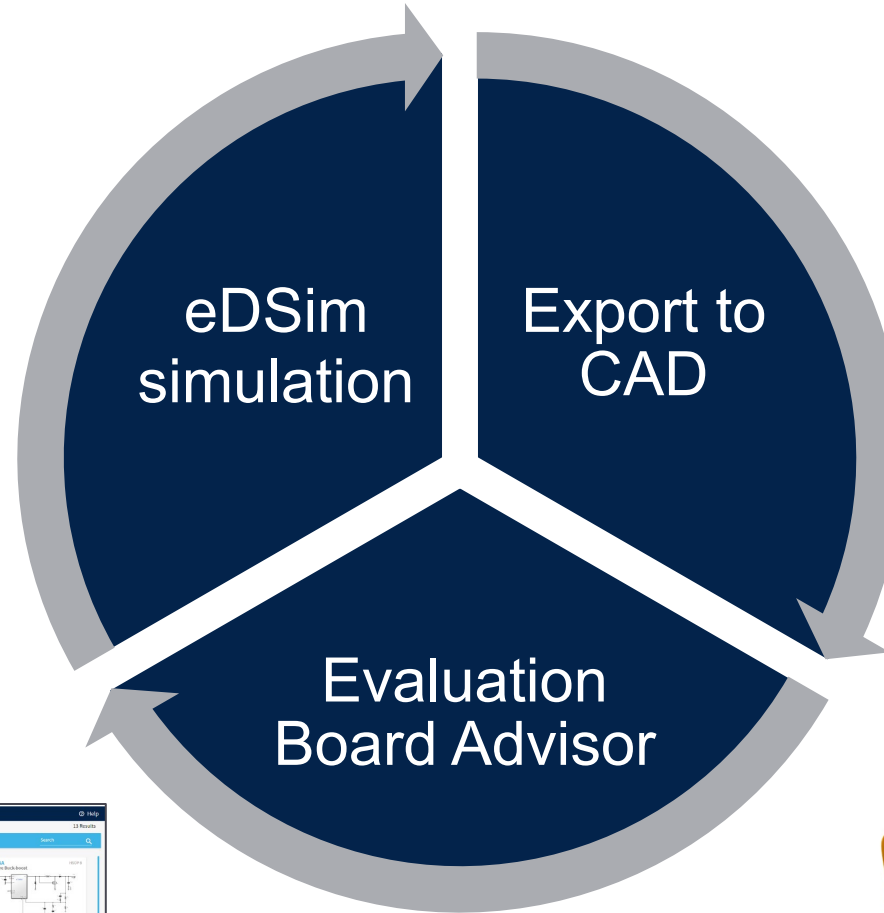
Export and customize the eDesignSuite project on eDSim

# A complete powerful tool ... to reduce risks in HW prototyping

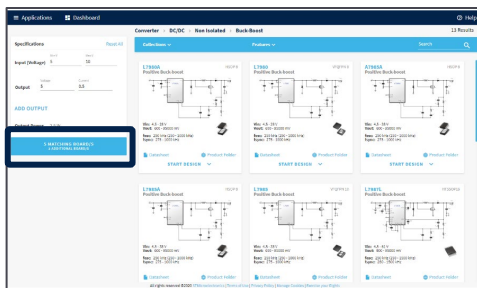
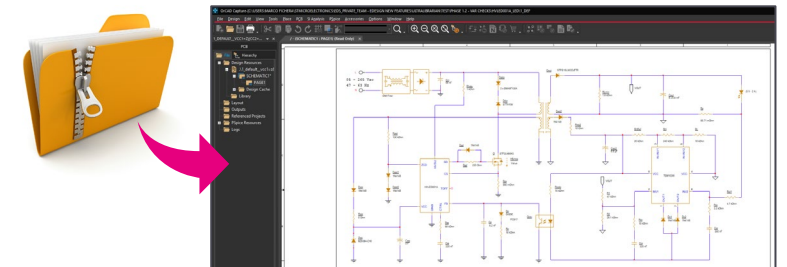
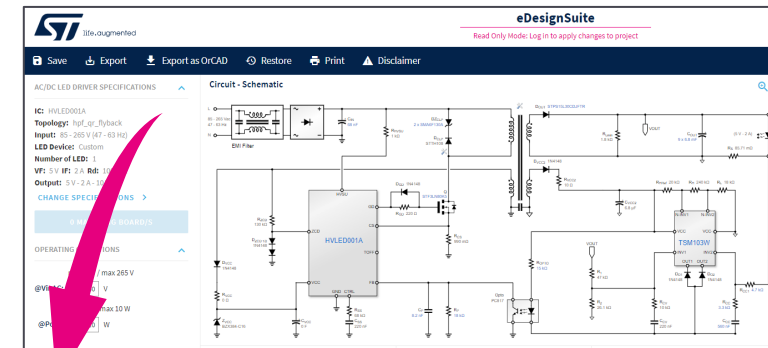


- ✓ Fine tune your IC behavior and related best configuration
- ✓ Extend the analysis in Time/frequency domain.
- ✓ Dive in specific usage case condition (mission profile)

- ✓ Helps select the evaluation board that best suits your needs



- ✓ Define your best system solution proposal
- ✓ Export in real time eDesignSuite Schematics into OrCAD Capture format

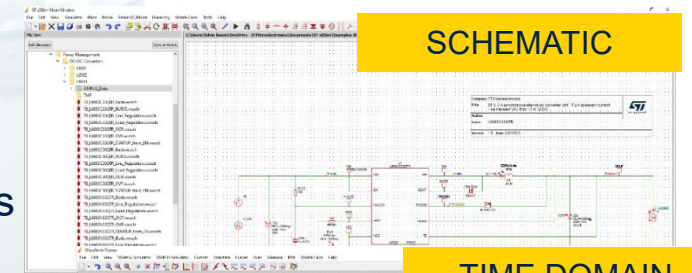


# New Fast and Powerful Simulator for SMPS and Analog

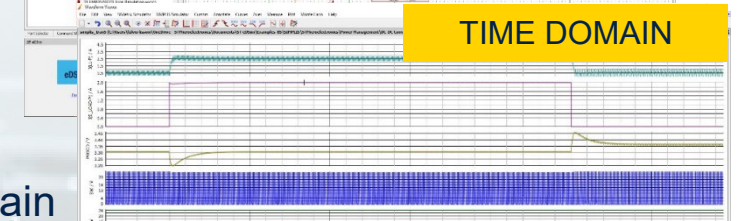


New Simulator available for our customers to accelerate design of DC-DC:

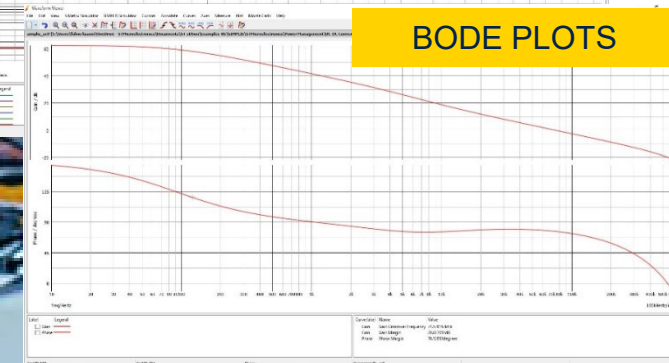
1. **10 to 50 times faster** than SPICE when simulating SMPS
2. Time and **Frequency** Domain simulations
3. Provide Loop stability with **Bode Plots**
4. Based on SIMPLIS engine, **in line** with main competitors (i.e. Maxim, Renesas, MPS)



SCHEMATIC



TIME DOMAIN



BODE PLOTS

eDSim to reduce risks in HW prototyping

## How to use eDSim?

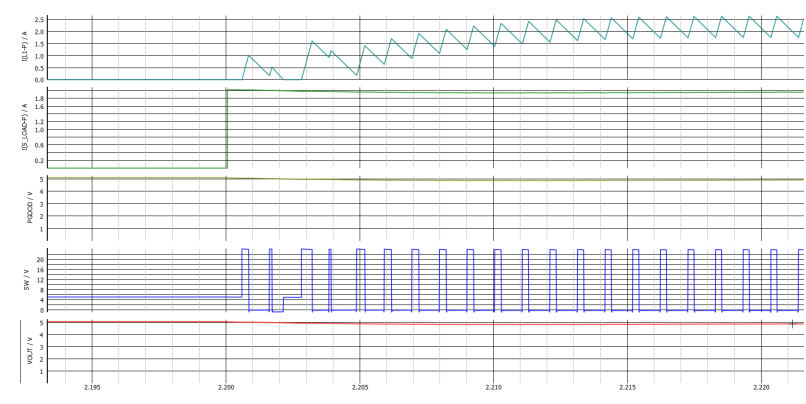
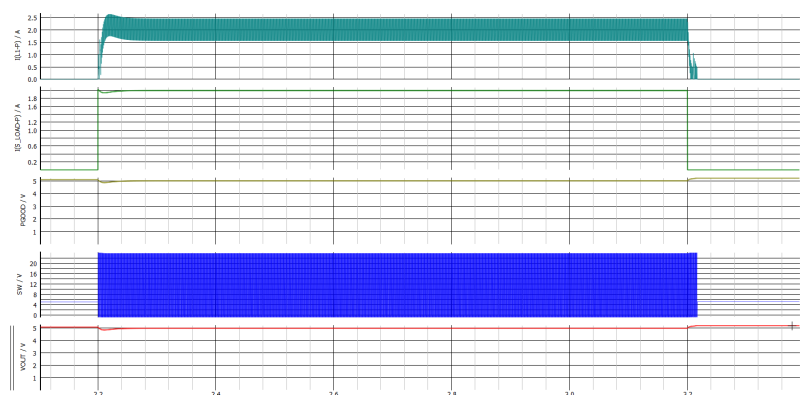
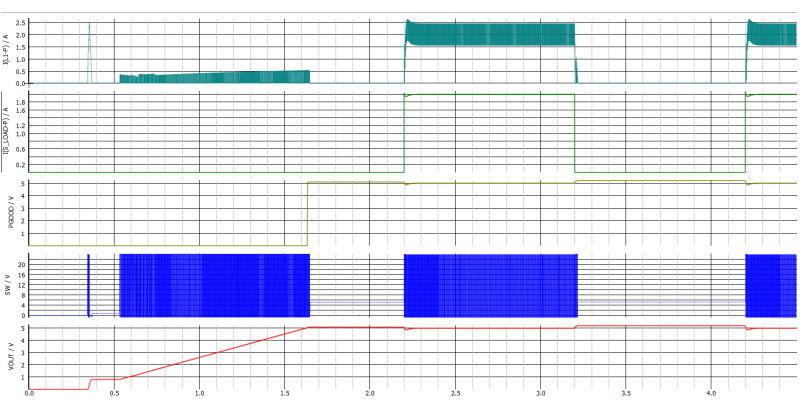
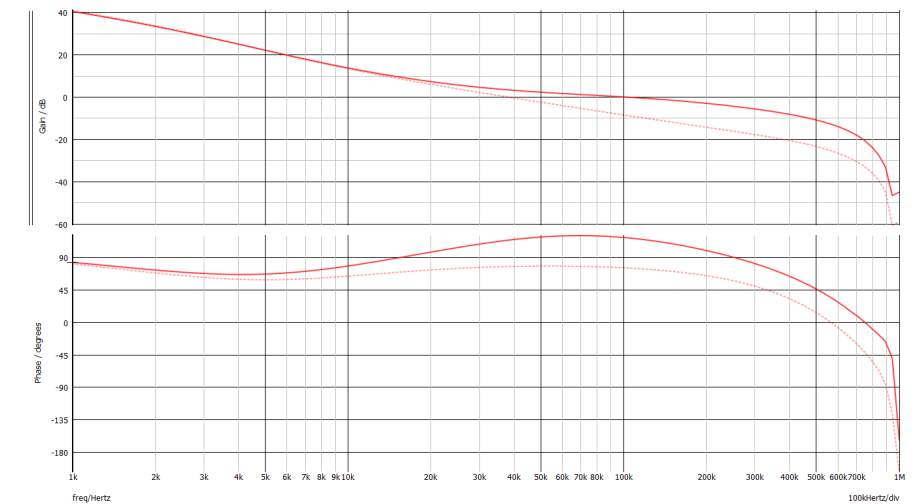
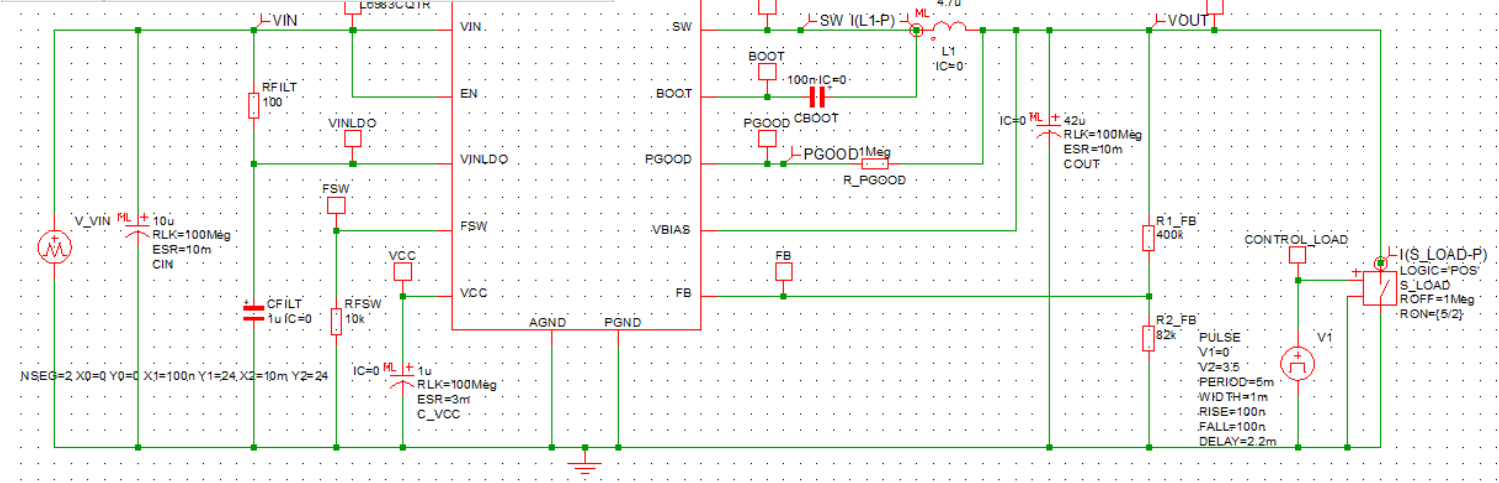
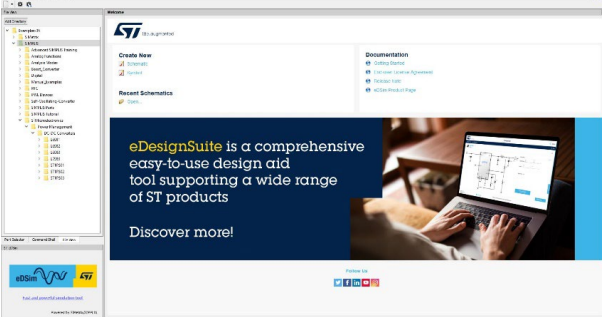
- Buck Converter example

Parameter	Value
Vin	12V
Vout	1.2V
Iout	10A
Fsw	500KHz

- SIMPLIS Schematic을 사용하여 open loop 회로도 생성
- SIMPLIS의 3가지 분석 방법을 통해 시뮬레이션 진행



# Simulation examples



# Evaluation Boards Advisor New Feature

A new capability is now available and used to show **Matching** and **Additional** boards number.

The **Matching Boards** are the ones that strictly satisfy user specification.

The **Additional Boards** are proposed applying **tolerances**<sup>(\*)</sup> on the user specs, allowing to suggest more boards for our customers.

The button information is refreshed each time the user changes the Electrical Parameters.

(\*) tolerances can be customized

**Specifications** Reset All

	Min V	Max V
Input (Voltage)	20	30
Output	5	1

**ADD OUTPUT**

Output Power 5 W

**8 MATCHING BOARD/S**  
2 ADDITIONAL BOARD/S

**(\*) Default tolerances:**

- Vin range: 40%
- Vout: 20%
- Iout: 20%

**Power Supply Design Tools > DC/DC > Non Isolated > Buck**

**Features** ▾

**A6902D** Buck

Vin: 8 - 36 V  
Vout: 1.24 V to Vin  
Iout: ≤ 1 A  
fosc: 250 kHz  
fsync: none

Datasheet Product Folder

START DESIGN ▾

**L6902D** Buck

Vin: 8 - 36 V  
Vout: 1.24 V to Vin  
Iout: ≤ 1 A  
fosc: 250 kHz  
fsync: none

Datasheet Product Folder

START DESIGN ▾

**A5970AD** Buck

Vin: 4 - 36 V  
Vout: 1.24 V to Vin  
Iout: ≤ 1 A  
fosc: 500 kHz  
fsync: 550 - 700 kHz

Datasheet Product Folder

START DESIGN ▾

**A5970D** Buck

Vin: 4 - 36 V  
Vout: 1.24 V to Vin  
Iout: ≤ 1 A  
fosc: 250 kHz  
fsync: 275 - 700 kHz

Datasheet Product Folder

START DESIGN ▾

# Evaluation Boards Advisor New Feature



eDesignSuite

Tools Dashboard

Power Supply Design Tools > DC/DC > Non Isolated > Buck

Specifications [Reset All](#)

Input (Voltage)

Output

ADD OUTPUT

Output Power 5 W

Features

A6902D L6902D

Converter DC/DC  52

Matching Boards

Vin: 3.5 V - 60 V; Vout: 5 V; Iout: 1.5 A - 3 A;

Part Number	IC	Topology	Price
STEVAL-L6981NDR	L6981NDR	Buck	36.0 US\$
STEVAL-L6981CDR	L6981CDR	Buck	36.0 US\$
STEVAL-ISA189V1	A6986F5V	Buck	27.3 US\$
STEVAL-L6982CDR	L6982CDR	Buck	36.0 US\$
STEVAL-L6982NDR	L6982NDR	Buck	36.0 US\$
STEVAL-ISA198V1	L7987L	Buck	30.0 US\$
STEVAL-ISA209V1	L6983	Buck	- US\$
STEVAL-ISA208V1	L6983CQTR	Buck	- US\$

8 MATCHING BOARD/S  
2 ADDITIONAL BOARD/S

8 Datasheet Product Folder

START DESIGN

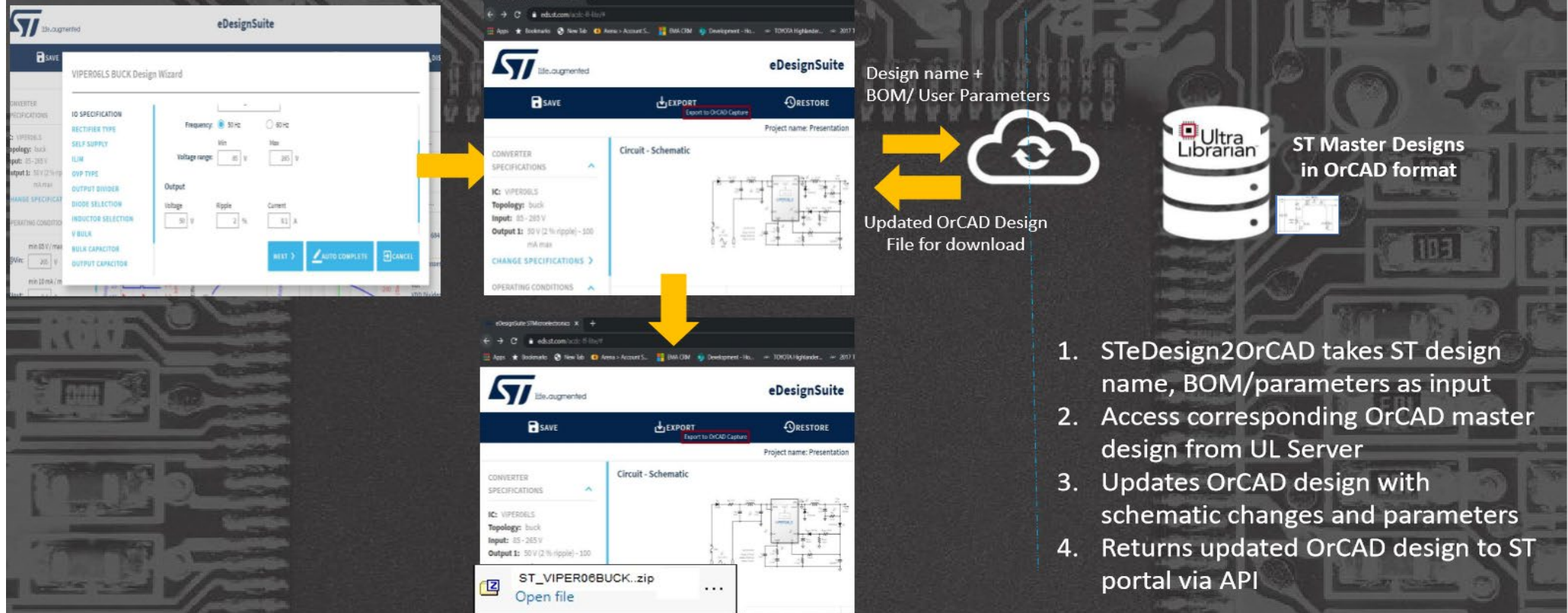
Clicking on the Button the Evaluation Boards Dialog will pop up, showing the Matching and the Additional boards



# eDesignSuite – OrCAD Capture integration

## ST eDesignSuite– OrCAD Capture Integration

- User enter the Design Spec and select 'Export to OrCAD Capture'



# Our technology starts with You



Find out more at [www.st.com](http://www.st.com)

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