

# eDesignSuite

The smart way to design your application



IMS Systems Lab & Technical Marketing

April 08<sup>th</sup>, 2013





Overview

Main features

Supported applications






Overview

Main features

Supported applications



# The application types supported



STMicroelectronics **eDesignSuite** is a smart simulator tool that greatly simplifies the task of engineers working on various application types

## eDesignSuite

The smart way to design your application

**Power Supply**  
DC/DC - AC/DC



**LED Lighting**  
DC/DC - AC/DC



**Photovoltaic**  
DC/DC



**Battery Charger**  
DC/DC - AC/DC



# Connecting to eDesignSuite



## Quick link

<https://myst.com/analogsimulator/>

**Dedicated page on ST website**  
[www.st.com/edesignsuite](http://www.st.com/edesignsuite)

**Application pages on ST website**  
Widget tailored for the selected application

**Product pages on ST website**  
Widget tailored for the selected IC or IC class

Login

Sign in to access either my.st.com or STPartner.  
If you have any issue logging in, please contact us

User ID (email address):

Save my user ID

Password:

---

New user? [Register](#)      Forgot your password? [Retrieve password](#)

eDesignSuite

LED DC/DC

LED AC/DC

Input Voltage presets

Volt. Min [V]  Volt. Max [V]

LED custom

Vf [V]  If [A]  Rf [Ω]

LEDs in the string:

Output Voltage Current Power

eDesignSuite

SMPS AC/DC

SMPS AC/DC

Input Voltage presets

Volt. Min [V]  Volt. Max [V]

Output

Output Power:

Voltage [V]  Current [A]

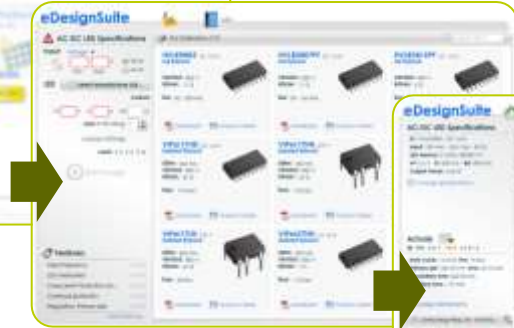
# A complete design in a few steps



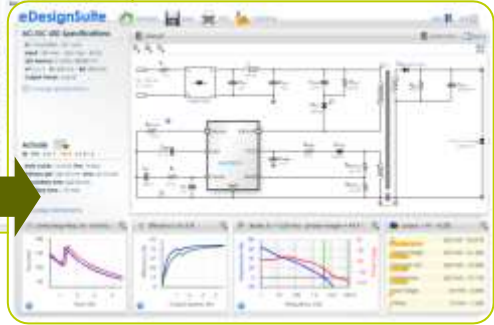
Click on quick link  
<https://myst.com/analogsimulator/>  
or  
Open  
**eDesignSuite off-line version**  
(ask to ST sales office)



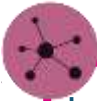
Choose an application type and create your design



Insert your I/O specifications and select one of the proposed IC driver



The design is ready!



Insert your I/O specifications in  
**eDesignSuite Widget**  
on product/application pages  
of ST web site



Select one of the proposed IC driver



The design is ready!

# Helps to select the optimal IC for your needs

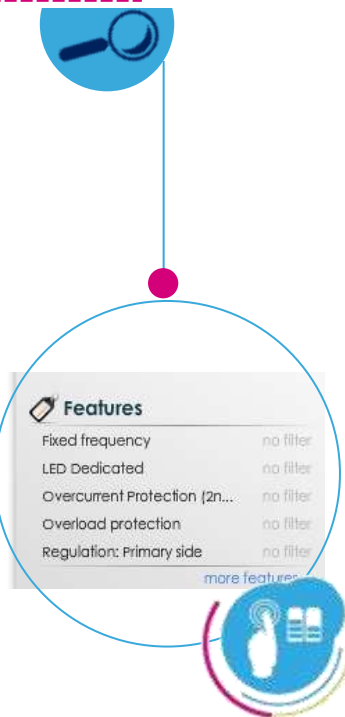
1

By inserting I/O specifications, the tool suggests you the right ICs



2

You can select, among the suggested ICs, only the ones with specific features



3

More ICs features available



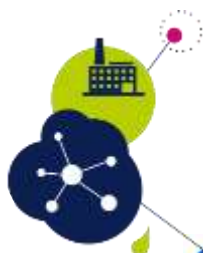
4

Start the design simulation with the filtered ICs





# What's in the design view?



eDesignSuite



A full set of commands

Help Size

Schematic

BOM

A fully and interactive BOM

## Converter Specifications

IC: VIPER06HN - DIP 7  
 Input: 185 Vac - 265 Vac - 50 Hz  
 Output Power: 2.4 W  
 Out 1: 12 V (2 % ripple) - 200 mA max

Change Specifications...

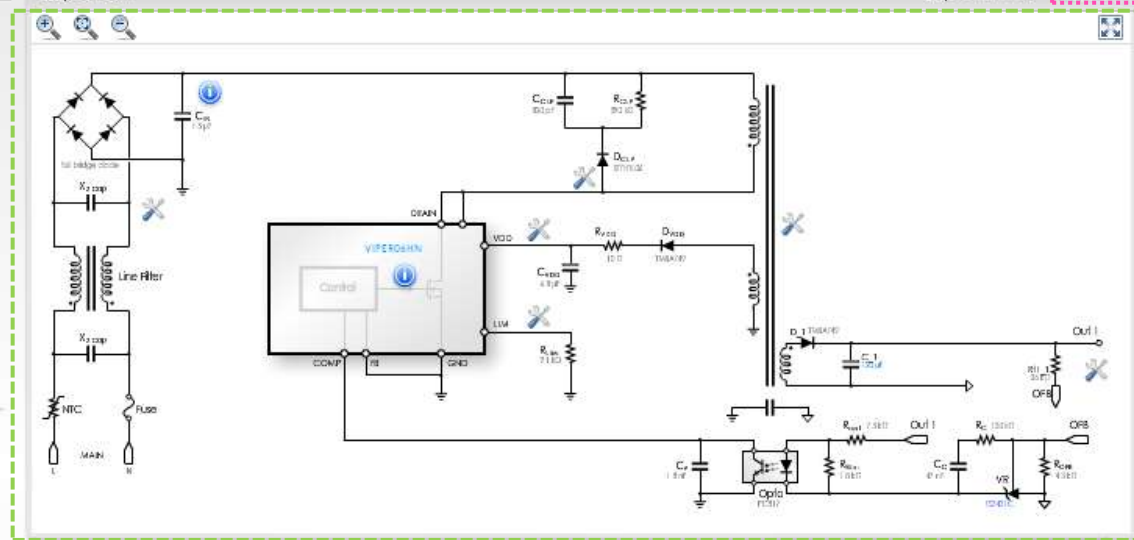
## Actuals

@( Vin: 265 V Pout: 2.4 W Ta: 25 °C )

VIper Tj: 75.8 °C  
 burst mode: off fsw : 115 kHz  
 Current Mode: discontinuous

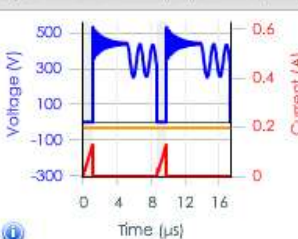
Design Summary...

## Circuit



A fully annotated and interactive schematic

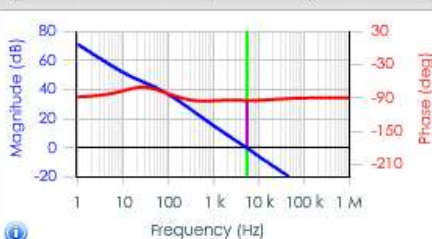
Simulation: duty cycle 12.9%



Efficiency: 69.5%



Bode: fc = 5.43 kHz - phase margin = 85 °



Losses: 1.1 W - 30.5%

VIPer	351 mW - 33.29%
Outputs	213 mW - 20.24%
Clamp Net	177 mW - 16.75%
Transformer	176 mW - 16.66%
ExtVIPer	111 mW - 10.55%
ExtBias	14 mW - 1.37%
Input Stage	12 mW - 1.14%

The specifications view

The actuals view

A full set of analysis diagrams







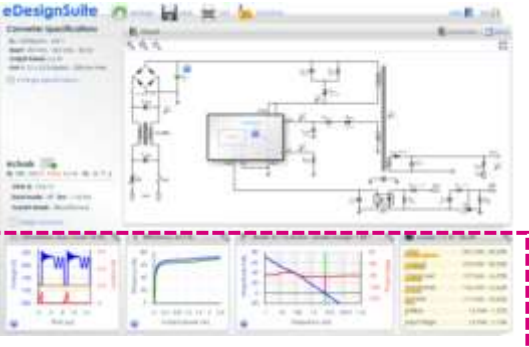
Overview

Main features

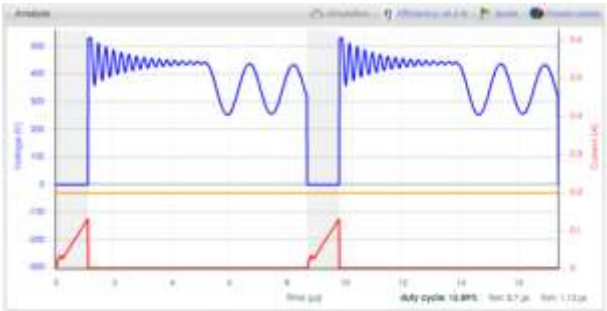
Supported applications



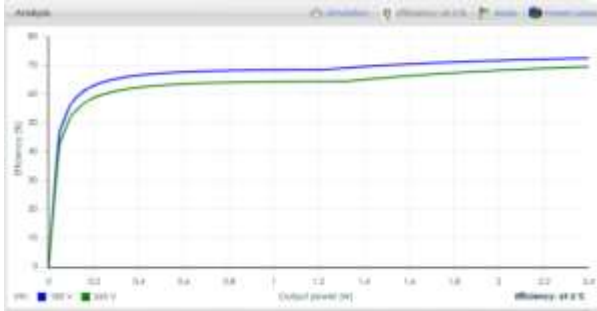
# Evaluate the performance of your design



● Waveforms simulator



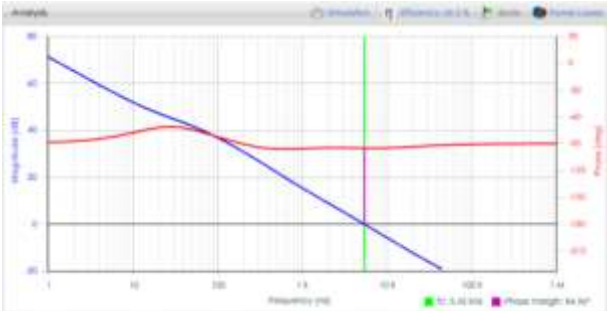
● Efficiency



## SIMULATIONS

The tool simulates major voltage and current waveforms, efficiency analysis, displays bode and power losses

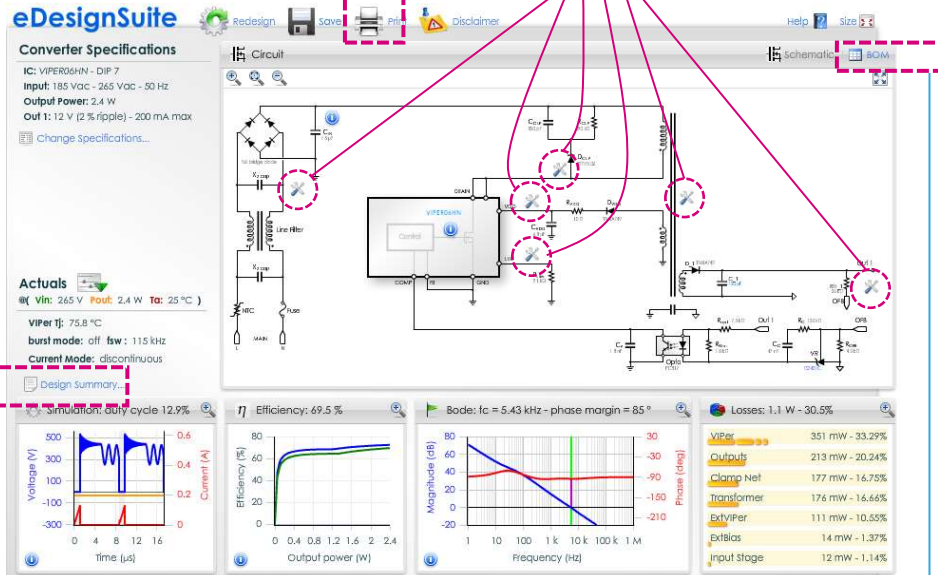
● Bode plots



● Loss distribution



# Complete and interactive schematic



## INTERACTIVE SCHEMATIC

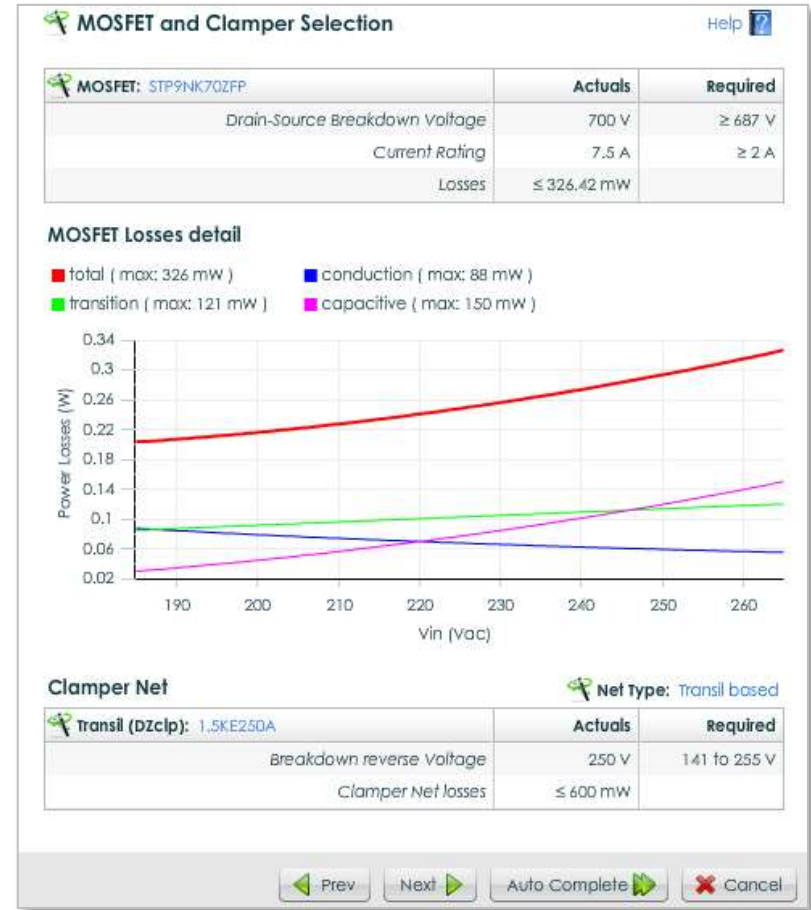
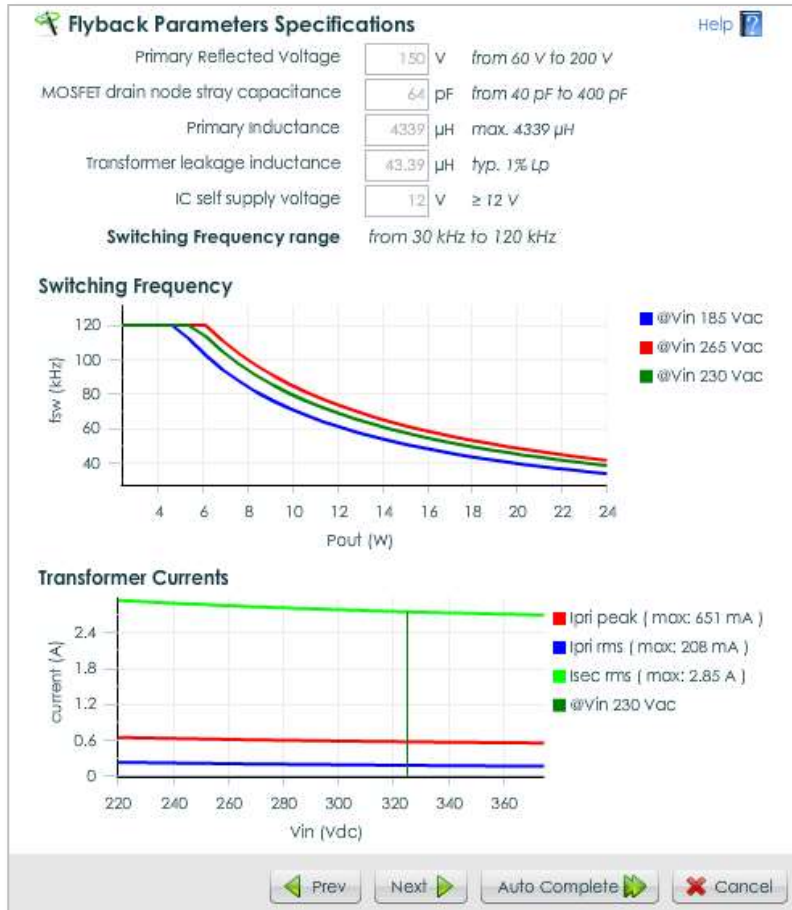
The user can refine sections of the schematic (clamping net, transformer, passive components, compensation net, MOSFETs, diodes, etc)

● Design report ready to print

● Design summary

● Bill of material

# Flyback specs and MOSFET selection



The complete setting of Flyback parameters in your hands

Evaluate the performance of selected MOSFETs

# The transformer design

## TRANSFORMER

You can change the proposed specifications for the transformer based on your needs

- Core type
- Turn layers of the windings
- Paralleled wires for each winding
- Wire type




### Transformer Design

Help ?

Core Type: EE10 Vertical	Actuals	Required
Area Product	148 mm <sup>4</sup>	≥ 16 mm <sup>4</sup>
Losses	≤ 184 mW	

Winding	Turns Layers	Paralleled	Wire Type eq. Cu section [mm <sup>2</sup> ]	fill factor	Losses
Primary	<input type="text" value="110"/> ≥ 106 3 Layers	<input type="text" value="1"/>	 Solid_G2 0.14 mm 0.015 (≥ 0.008)	28 %	≤ 7 mW
Secondary	<input type="text" value="15"/> 3 Layers	<input type="text" value="3"/>	 TiW 0.2 mm 0.031 (≥ 0.027)	65 %	≤ 14 mW
Auxiliary	<input type="text" value="15"/> 1 Layer		 Solid_G2 0.053 mm 0.002 (≥ 0.002)	4 %	≤ 1 mW

#### Results

Primary inductance: 2.94 mH  
leakage inductance: 88.2 μH  
Np/Ns: 7.333 (Best Ratio: 7.308)  
Reflected Voltage: 95 V (Required : 95 V)  
Vaux: 12.2 V (Required : 12.5 V)  
total Aw fill factor: 96.46 %  
maximum magnetic flux density: 307 mT  
required gap length: 0.06 mm (AL : 243 nH/N<sup>2</sup>)  
Transformer total losses: 204 mW

OK Cancel

# Your design gets portable and exportable

The screenshot displays the eDesignSuite software interface. On the left, the 'Converter Specifications' panel lists: IC: VIPER65HN - DIP 7, Input: 185 VAC - 265 VAC - 50 Hz, Output Power: 2.4 W, and Out 1: 12 V (2% ripple) - 200 mA max. Below this, 'Actuals' shows Vin: 265 V, Pout: 2.4 W, and Ta: 25 °C. The main window shows a detailed circuit schematic with a central VIPER65HN IC. At the bottom, there are four simulation plots: 1) Voltage and Current waveforms over time (0-16 μs), 2) Efficiency plot (69.5%) vs Output power (0-2.4 W), 3) Bode plot (fc = 5.43 kHz, phase margin = 85°) showing Magnitude (dB) and Phase (deg) vs Frequency (Hz), and 4) Losses table:

Component	Power (mW)	Efficiency (%)
VIPer	351	33.29%
Output	213	20.24%
Clamp Net	177	16.75%
Transformer	176	16.66%
ExtVIPer	111	10.55%
Diodes	14	1.37%
Input Stage	12	1.14%

A close-up view of the software toolbar. The 'Save' icon is highlighted with a red dashed box. Below it, the 'Save As...' and 'Export to Pspice...' options are also highlighted with red dashed boxes. The 'Export to Pspice...' option includes a small icon of a circuit board.



## Save

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



## Export to Pspice

Create a Pspice netlist in order to perform a simulation of the design in the Cadence Orcad platform





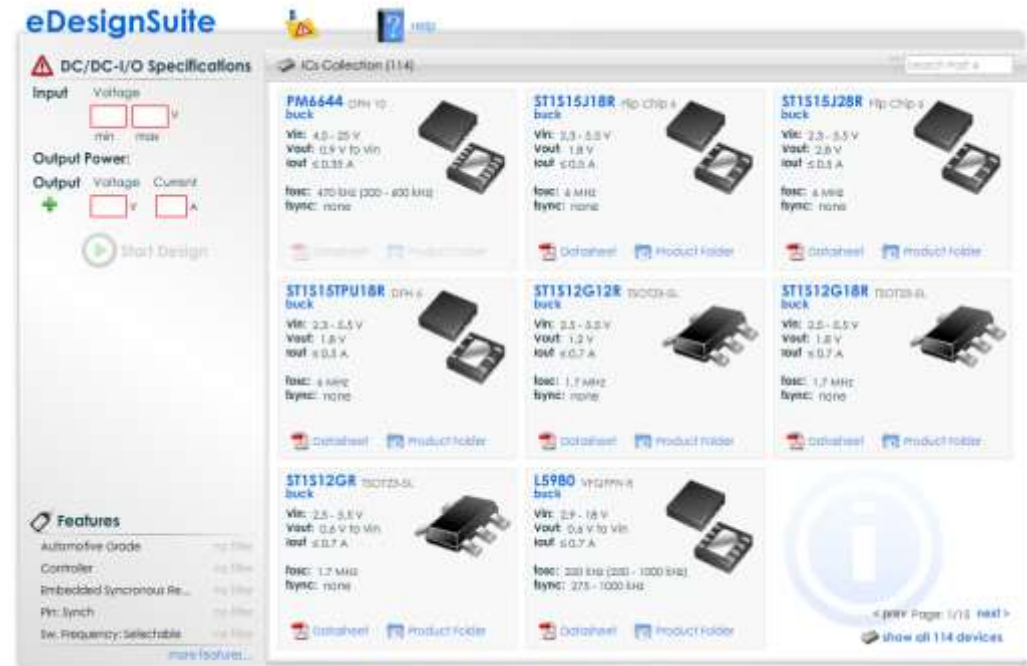
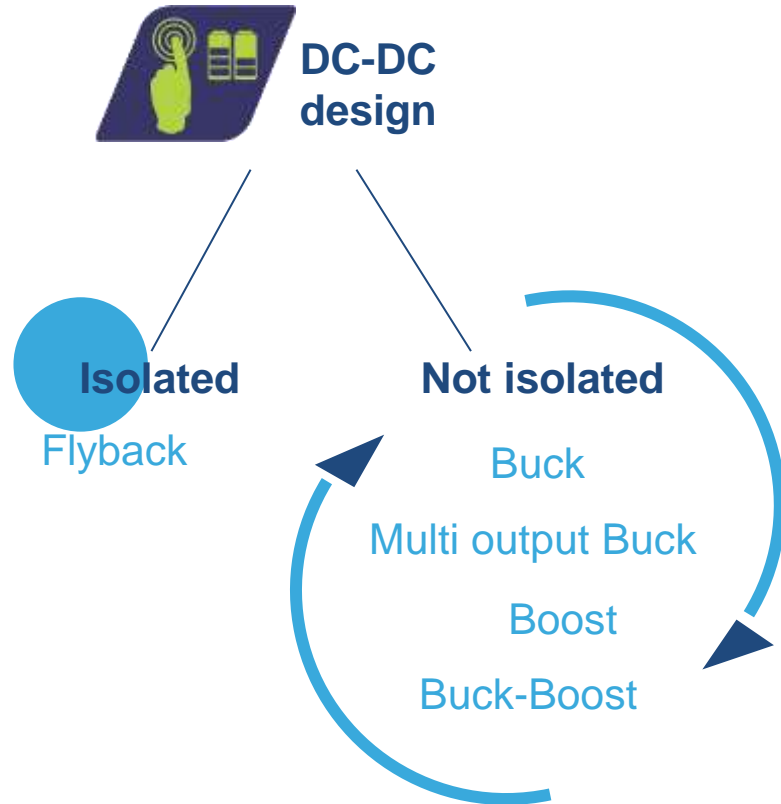
Overview

Main features

Supported applications



# Power Supply DC-DC application type



More than 100 ICs to design a DC-DC converter

# Power Supply AC-DC application type



AC-DC design

Not isolated

Isolated

Buck  
FF Flyback

FF Flyback

QR Flyback  
with and without  
primary regulation

## eDesignSuite

### AC/DC-I/O Specifications

Input voltage (230 V)   V  50 Hz  60 Hz  
min max

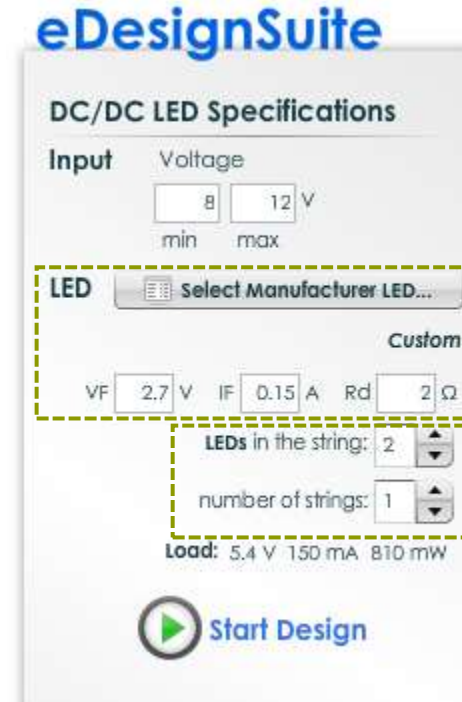
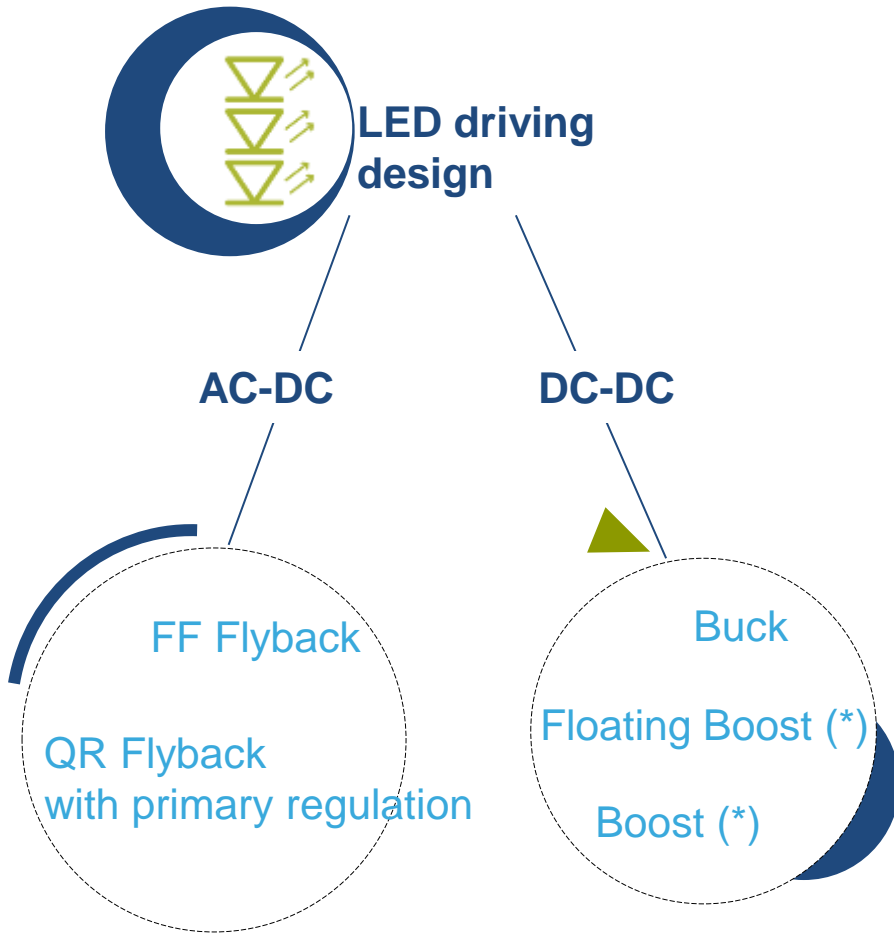
Output Power: 7.9 W

Output	Voltage	Current
+	10 V	0.1 A
×	8 V	0.3 A
×	4 V	0.3 A
×	5 V	0.3 A
×	6 V	0.3 A

## MULTI-OUTPUT DESIGN

The tool is able to manage until 5 outputs!

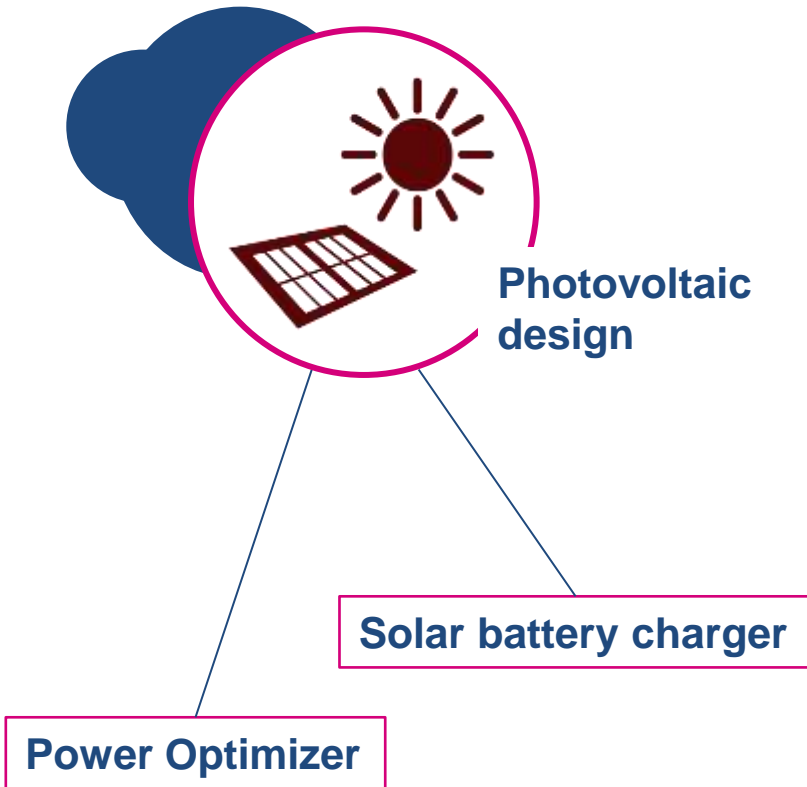
# LED driving application type



Select LEDs from a list of manufacturers or insert customer parameters

Insert the number of LEDs in the string and fix the number of strings

# Photovoltaic application type



Photovoltaic - IO Specification

Input: Panel Specification

Vmp:  V    Voc:  V

Imp:  A    Isc:  A

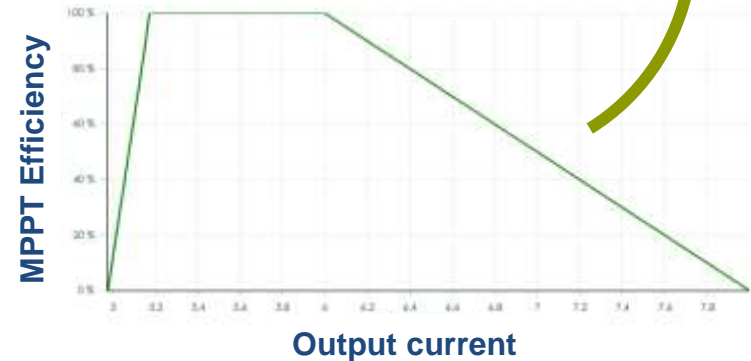
Vin Ripple:  %

Output:

Voltage:  V    Ripple:  %    Current:  A

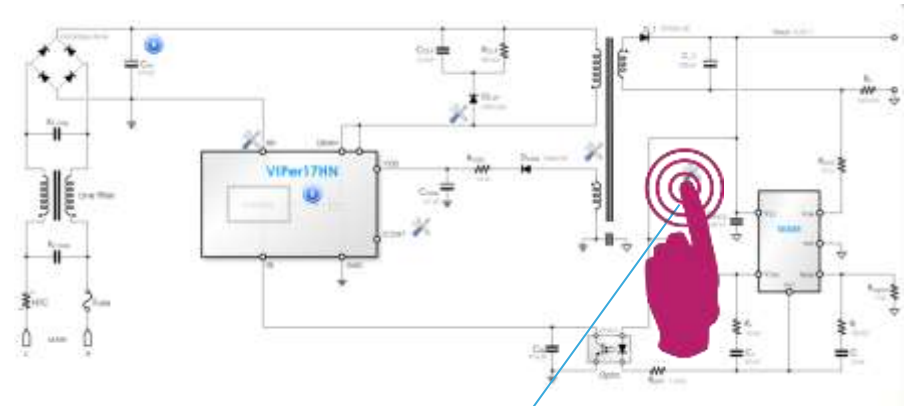
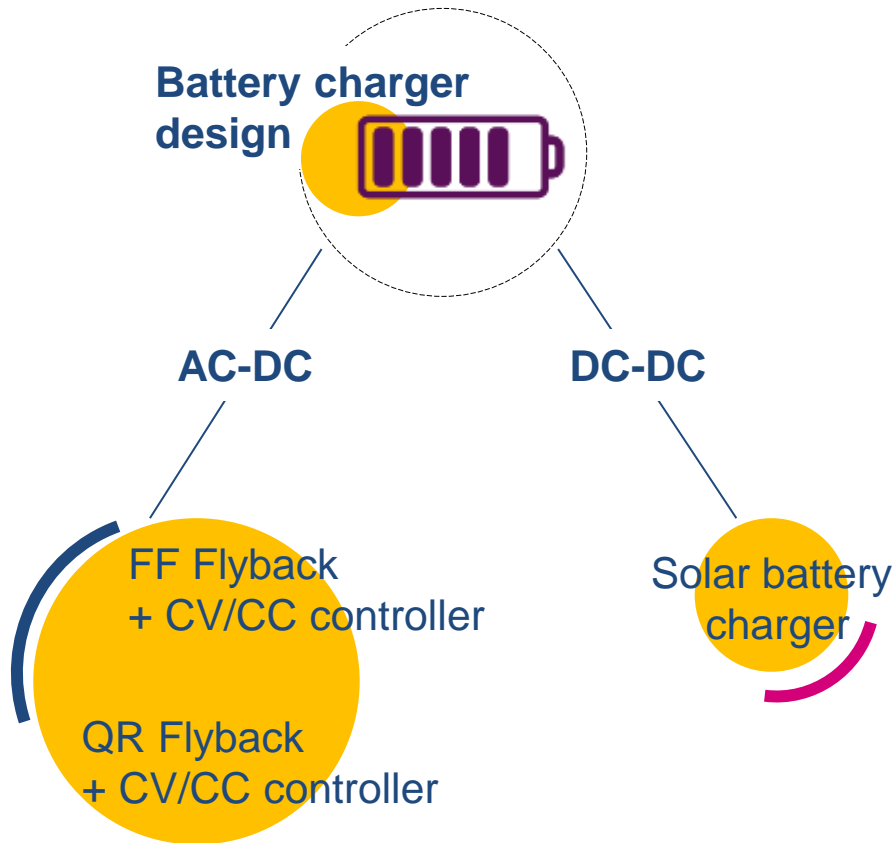
Ok    Cancel

Insert I/O specification and start your design!



From the PV panel to your solar application with embedded **MPPT** (max power point tracking)

# Battery charger application type







For more information

[www.st.com/edesignsuite](http://www.st.com/edesignsuite)

