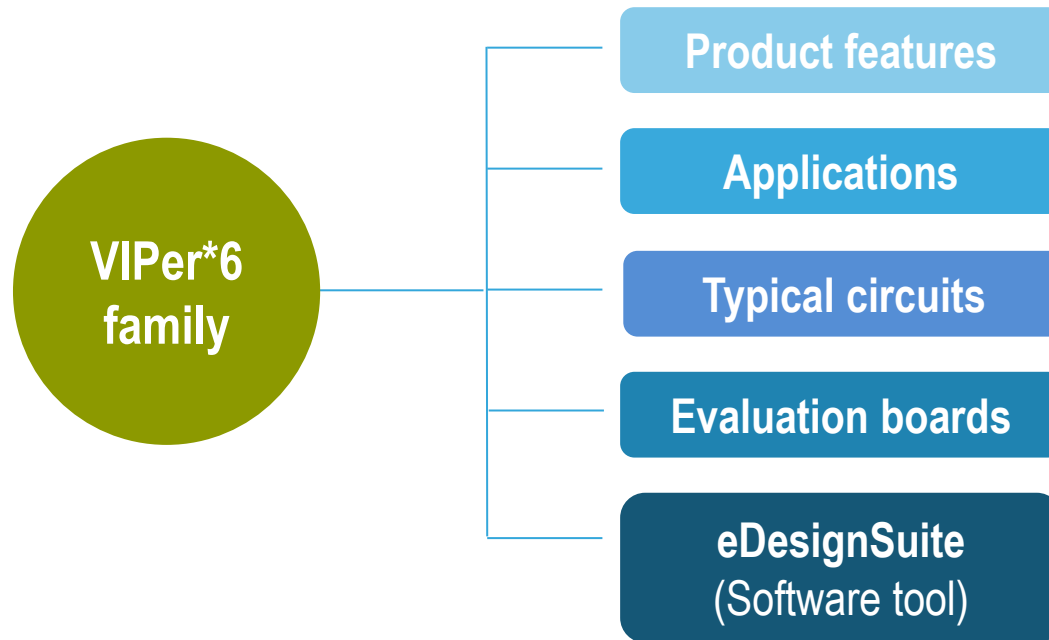
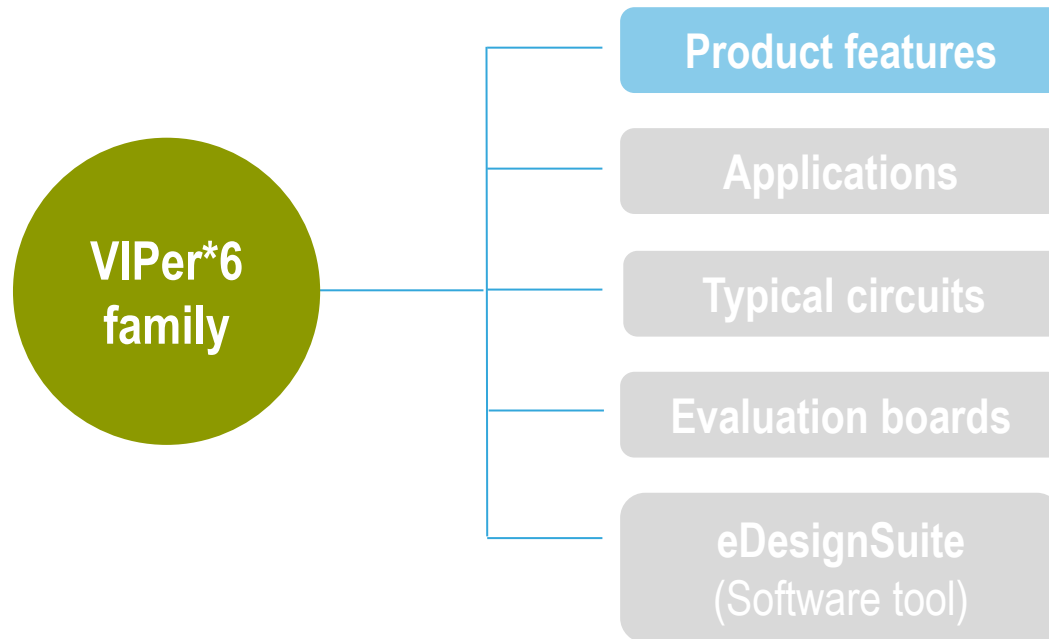


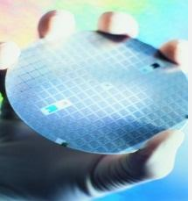
VIPer*6 family: *The fast lane to SMPS design*





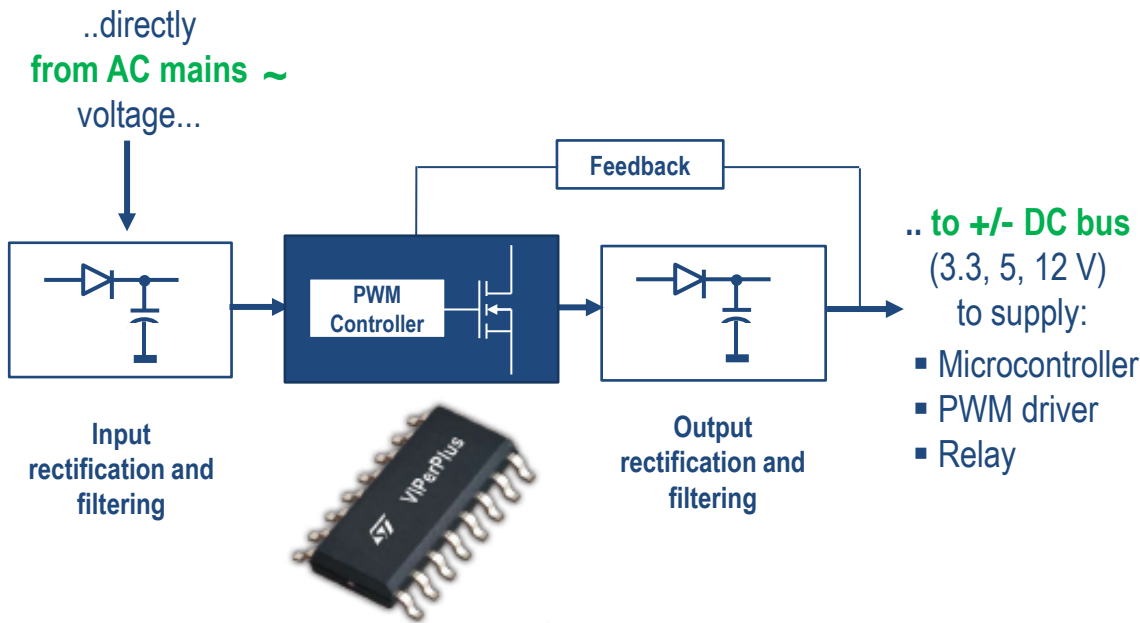


The fast lane to design switch mode power supplies



VIPerPlus – high-voltage converter

Advanced controller with embedded 800 V power MOSFET



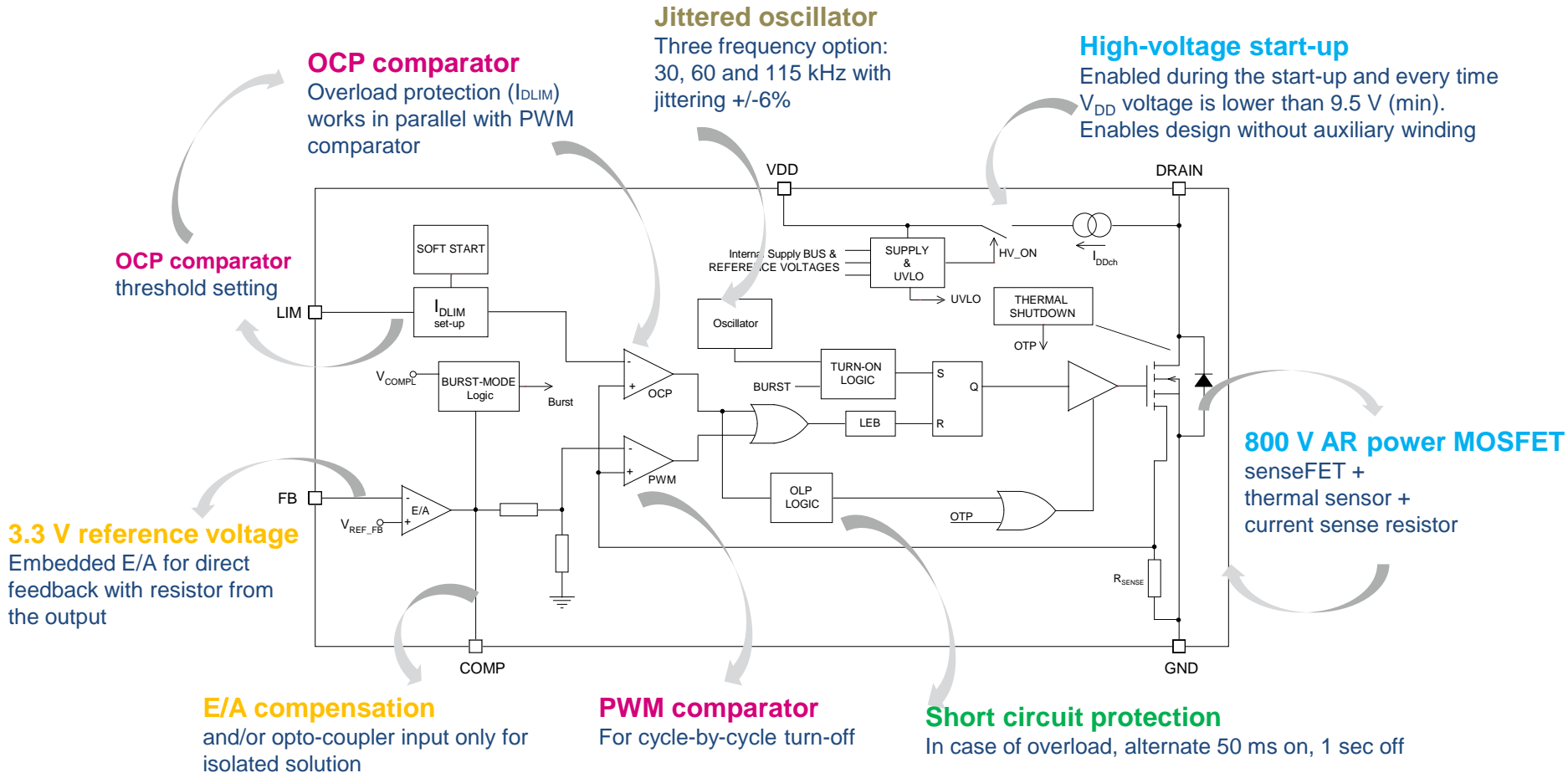
Robustness and reliability
800 V power MOSFET, thermal shutdown, soft start, OLP protection, auto-restart

Energy saving
Power consumption less than 30 mW at no load

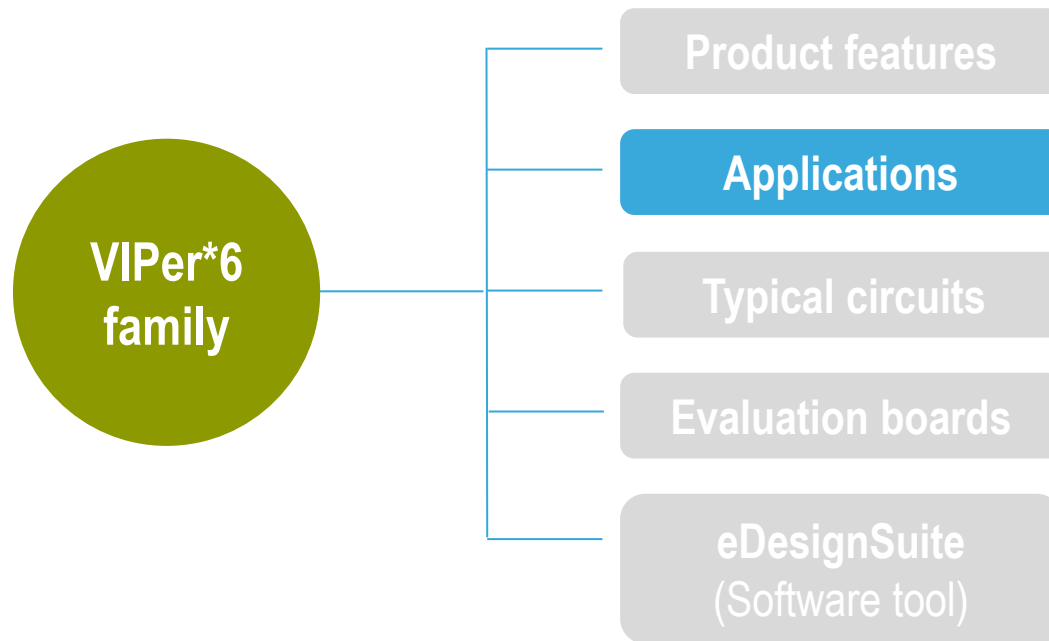
High integration
Direct feedback, jittering, HV start-up

Flexibility
Power scalability up to 12 W, no aux winding, clampless design, no CM EMC filter

VIPer*6 family: block diagram



VIPer*6 family	VIPer06	VIPer16	VIPerA16	VIPer26
P_{OUT} @ 85 to 265 Vac	4 W	6 W	6 W	12 W



VIPer*6 family

Fixed-frequency AC-DC converters

VIPer06, VIPer16, VIPerA16, VIPer26



Metering



Home
appliances



Home
automation



Lighting



Automotive

The best choice to power your microcontroller

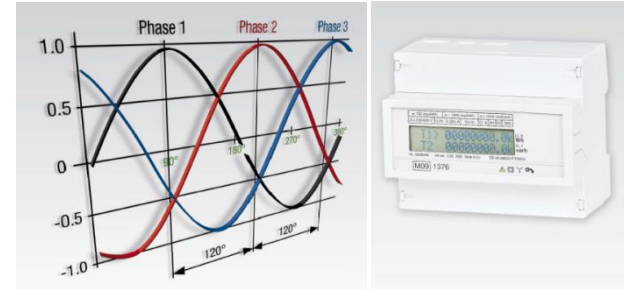


VIPer*6 for metering

VIPer*6 in smart-energy meters

VIPer*6 based AC-DC auxiliary power supply for

- microcontrollers
- transceivers
- metrology ICs



Aux SMPS market needs

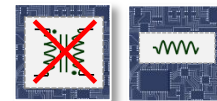
A flowchart illustrating market needs for auxiliary SMPS. It starts with a photo of a meter, followed by a diagram of a three-phase system (R, T, S) with 120-degree phase shifts. This leads to a graph showing reduced noise in the communication band, and finally to a photo of a meter on a utility pole labeled 'Robustness'.

VIPer*6 key benefits and supported topologies

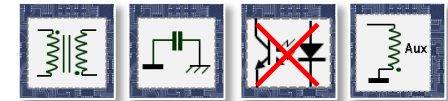


VIPer*6, key benefits for the application

- 30 kHz switching frequency to reduce noise in the communication band (only VIPer06)
- 800 V breakdown
- Op amp available for primary regulation



Inductor based topology Buck



Flyback topology Isolated with primary regulation



VIPer*6 for home appliances

VIPer*6 in home appliances

VIPer*6 based AC-DC auxiliary power supply for

- microcontrollers
- LEDs
- user interfaces
- motor driver ICs



Small home appliances



Major appliances

Aux SMPS market needs

Small EMI input filter

Power scalability

Clampless

High efficiency

Reduced size

Powering MCU to drive Triac

VIPer*6 key benefits and supported topologies

VIPer*6, key benefits for the application

- Frequency jittering
- VIPer*6 pin-to-pin compatible
- 800 V breakdown
- Self supply
- Op amp available for primary regulation or direct feedback

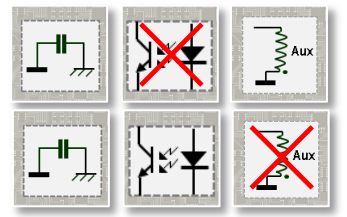
Inductor based topologies

Buck
common neutral

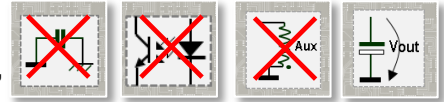
Buck-boost
negative output, common neutral

Smart flyback topologies

- Isolated
- primary regulation
 - secondary regulation



- Non-isolated direct feedback, positive/negative output, common neutral





VIPer*6 for home automation

VIPer*6 in home automation

VIPer*6 based AC-DC auxiliary power supply for

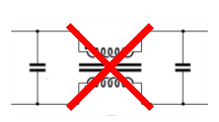
- microcontrollers
- transceivers
- sensors
- motor driver ICs



Aux SMPS market needs



Low standby power



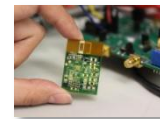
Small EMI input filter



Reliability



Cost saving



Cap SMPS replacement



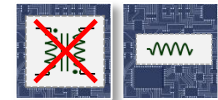
Powering MCU to drive Triac

VIPer*6 key benefits and supported topologies



VIPer*6, key benefits for the application

- 30 mW @ no load
- Frequency jittering
- 800 V breakdown
- Self supply
- Op amp available for direct feedback



Inductor based topology
Buck



Smart flyback topologies
Non-isolated, direct feedback, positive/negative output, common neutral

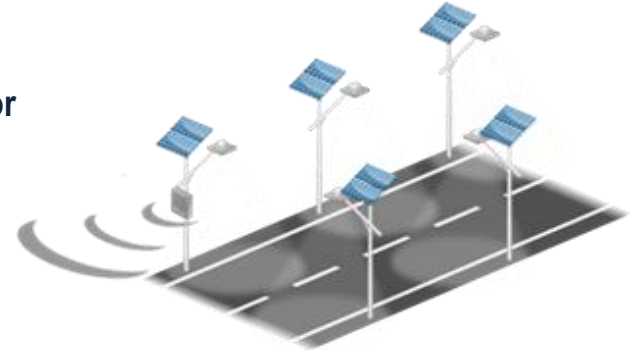


VIPer*6 for lighting

VIPer*6 in street lighting

VIPer*6 based AC-DC auxiliary power supply for

- microcontrollers
- transceivers
- lighting driver ICs



Aux SMPS market needs

<p>Low standby power</p>	<p>Robustness</p>	<p>Cost saving</p>	<p>Reduced size</p>	<p>High efficiency</p>
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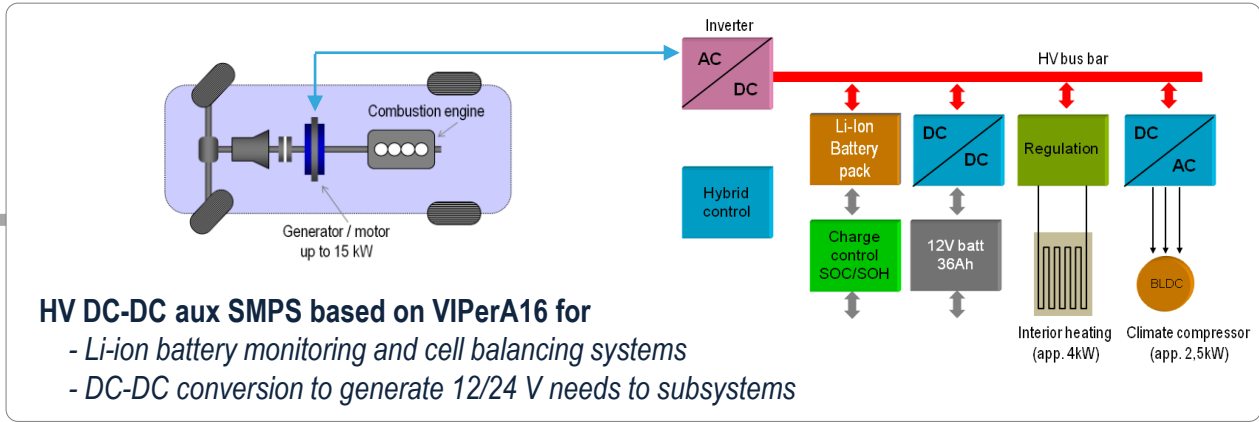
VIPer*6 key benefits and supported topologies

<p>VIPer*6, key benefits for the application</p> <ul style="list-style-type: none"> ▪ 30 mW @ no load ▪ Operating temperature: -25 to +125 °C ▪ 800 V breakdown ▪ Self supply ▪ Op amp available for primary regulation 	<p>Inductor based topology Buck</p>	<p>Smart flyback topologies</p> <table border="1"> <tr> <td data-bbox="1186 976 1282 1076"></td> <td data-bbox="1302 976 1398 1076"></td> <td data-bbox="1418 976 1514 1076"></td> <td data-bbox="1534 976 1862 1219">Isolated with secondary regulation</td> </tr> <tr> <td data-bbox="1186 1262 1282 1362"></td> <td data-bbox="1302 1262 1398 1362"></td> <td data-bbox="1418 1262 1514 1362"></td> <td data-bbox="1534 1262 1862 1390">Isolated with primary regulation</td> </tr> </table>				Isolated with secondary regulation				Isolated with primary regulation
			Isolated with secondary regulation							
			Isolated with primary regulation							

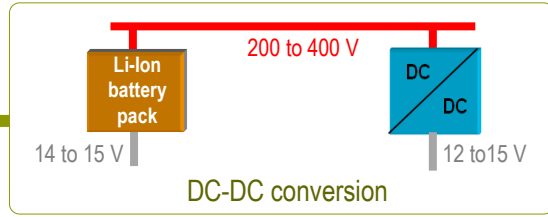


VIPerA16 for automotive

VIPerA16
in automotive
hybrid/EV control



Aux SMPS
market needs

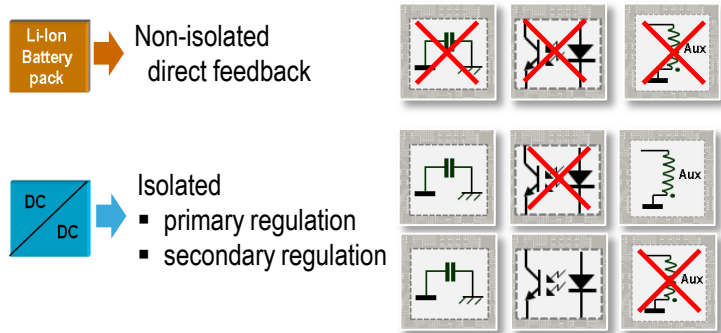


VIPerA16
Key benefits and
supported topologies

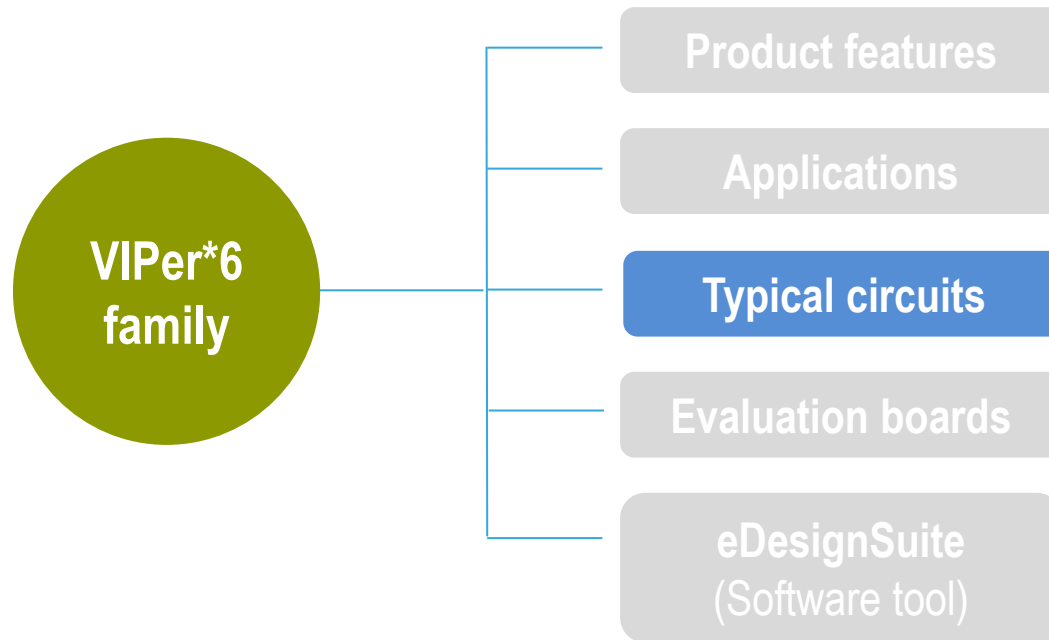
VIPerA16 – automotive grade 1, key benefits for the application

- AEQ100 compliant
- Operating temperature: -40 to +125 °C
- 800 V breakdown
- Op amp available for direct feedback

Smart flyback topologies

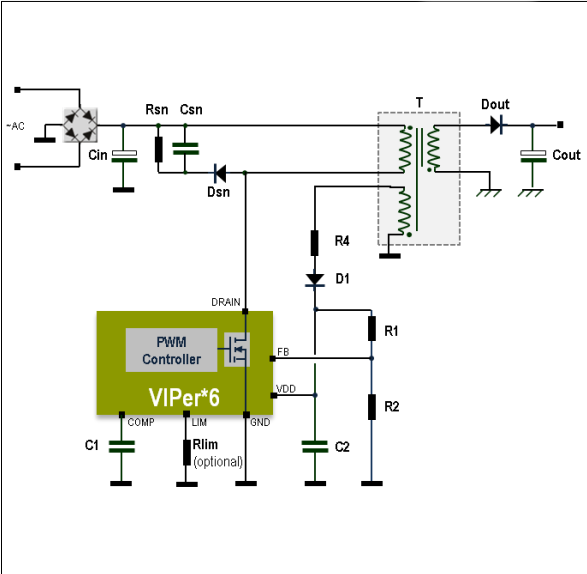


Contact your ST office for further information on VIPerA16



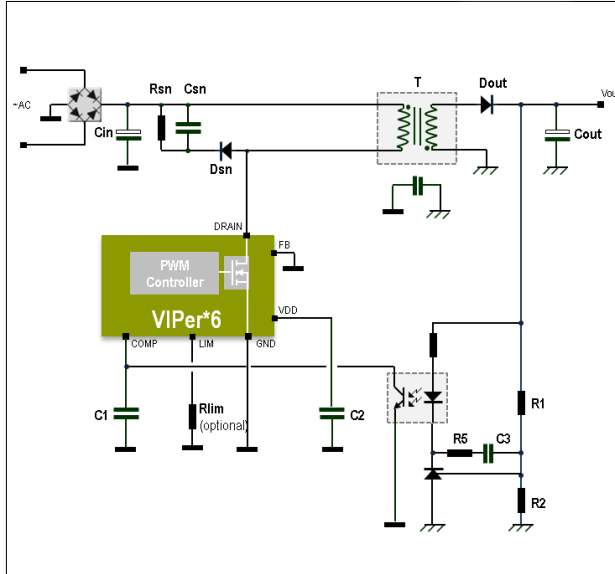
VIPer*6: isolated flyback

Primary regulation



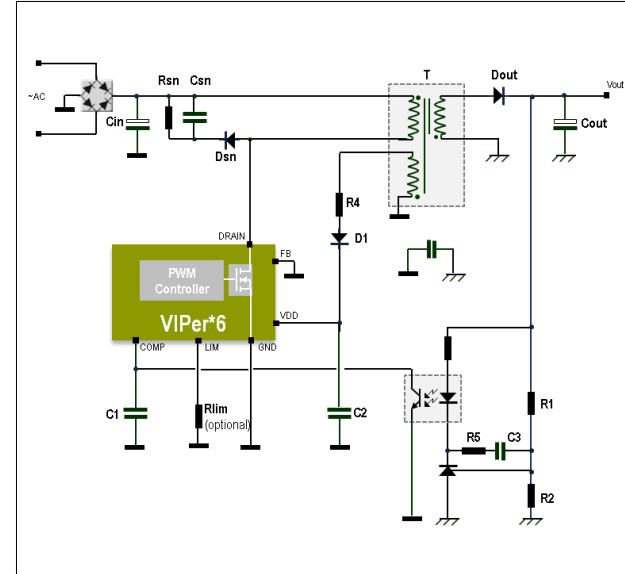
Perfect trade-off between isolation, cost and output regulation

Secondary regulation

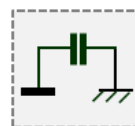


Standard topology without aux winding (VIPer self supply)

Secondary regulation

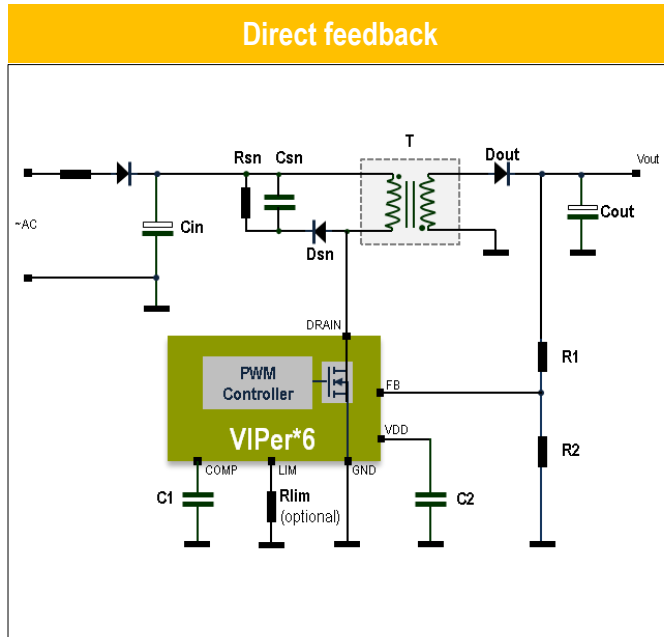


Standard topology with the lowest standby consumption

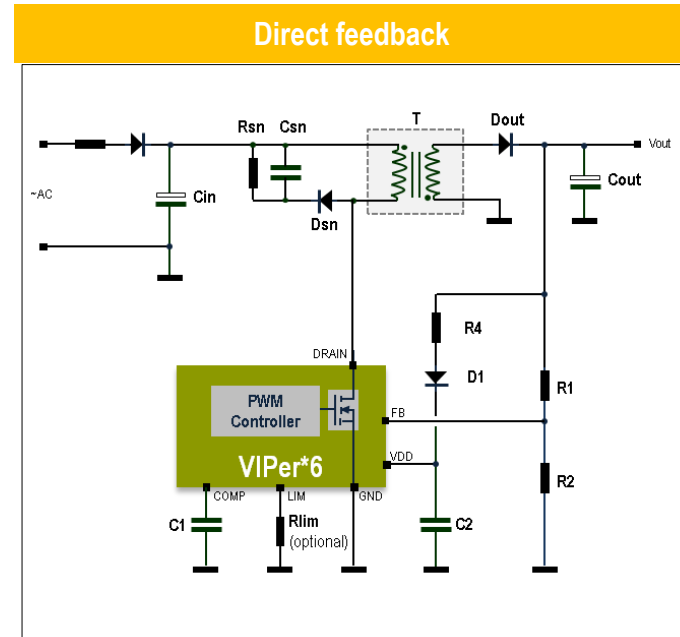


Isolated auxiliary SMPS

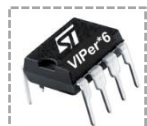
VIPer*6: non-isolated flyback_(1/2)



Minimal component count



Minimal component count
with the lowest standby consumption
($V_{OUT} \geq 12\text{ V}$)

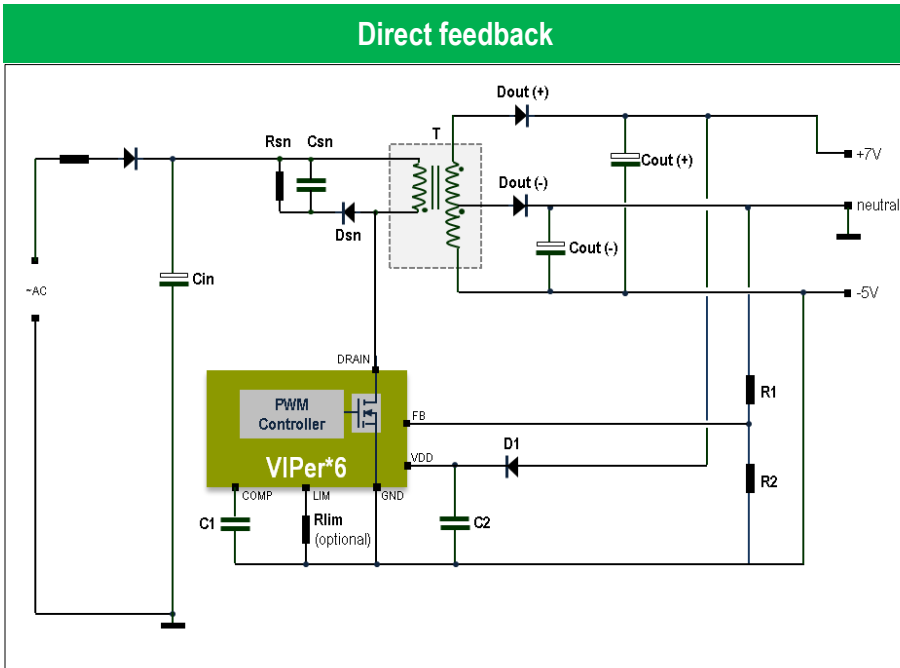


Non-isolated auxiliary SMPS

VIPer*6: non-isolated flyback_(2/2)

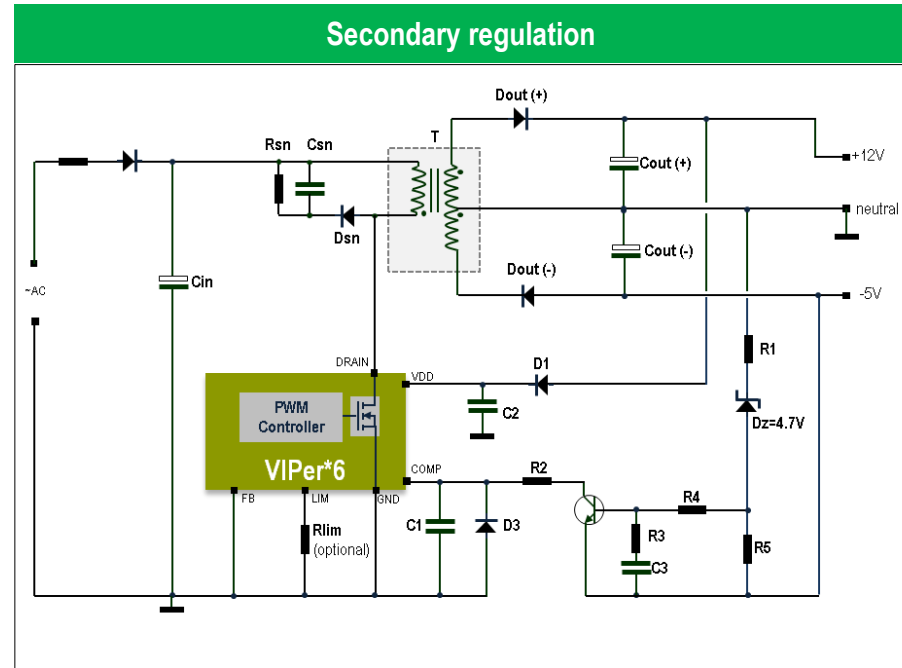
Configurations with positive and negative outputs

Direct feedback



+7 V and -5 V: outputs referred to neutral with lowest standby consumption

Secondary regulation

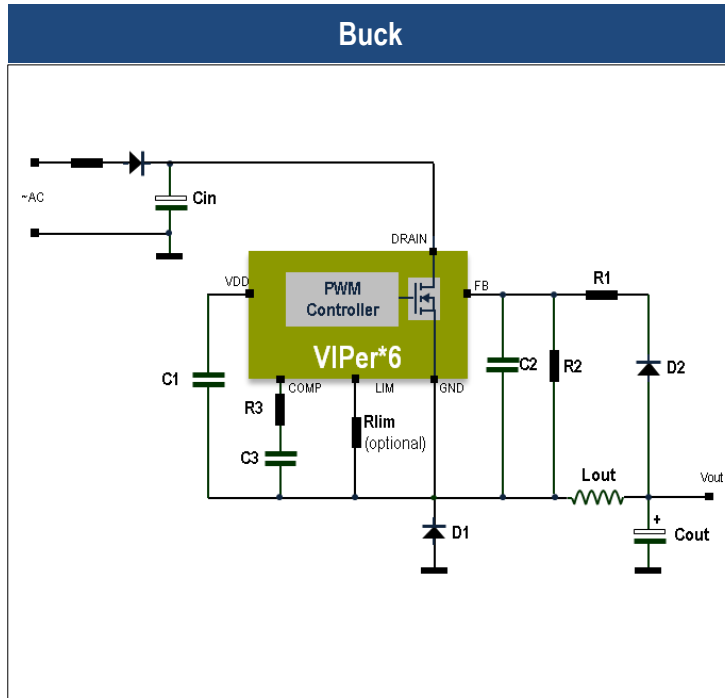


+12 V and -5 V: outputs referred to neutral with lowest standby consumption

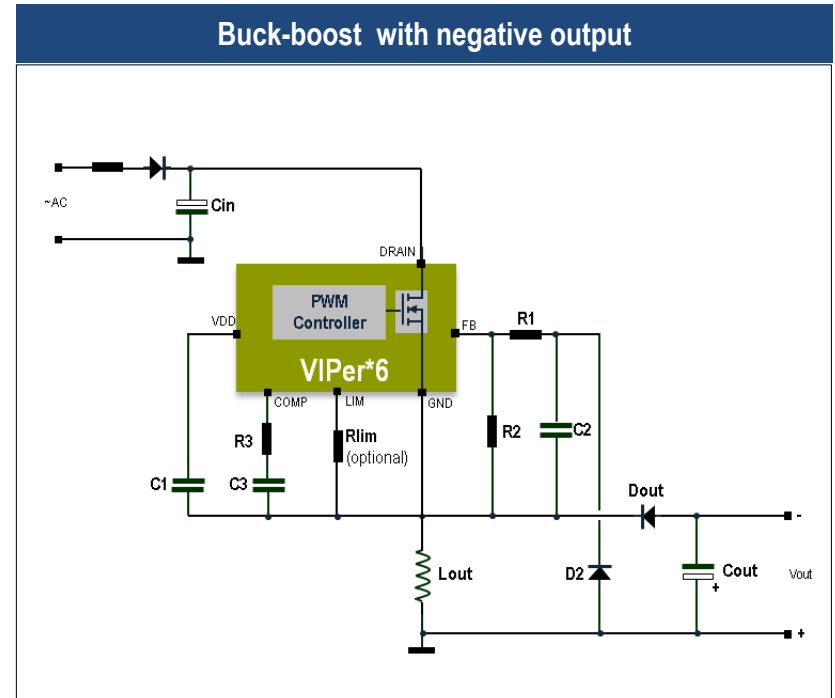


Non-isolated auxiliary SMPS

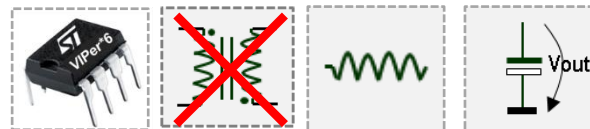
VIPer*6: inductor based topologies



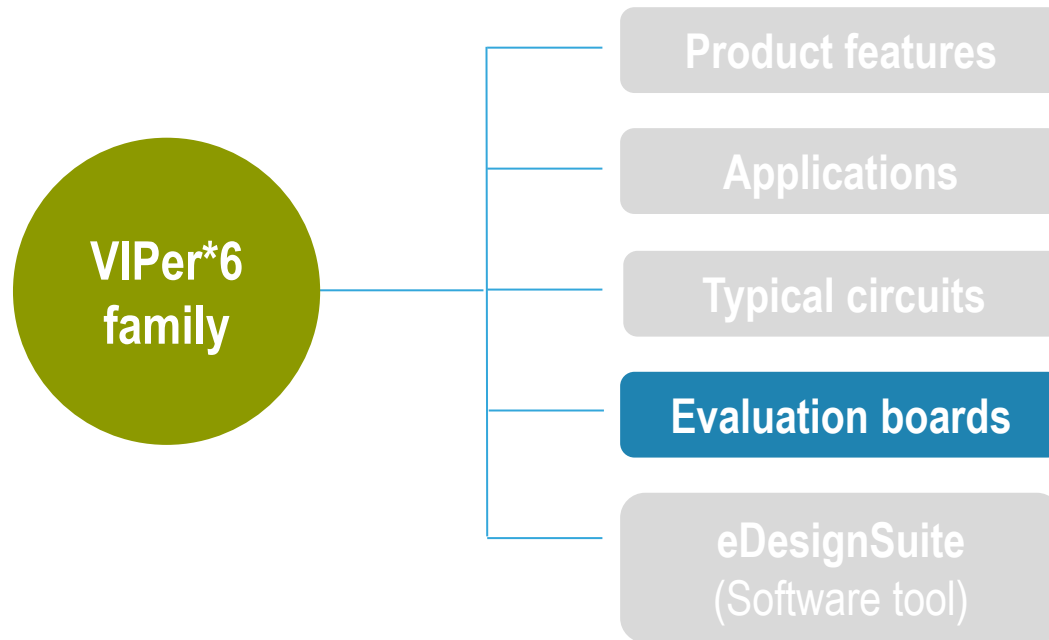
Simplicity and minimum size guaranteed



Powering an MCU to drive a Triac



Non-isolated auxiliary SMPS



STEVAL-ISA130V1 (*)

1.7 W buck converter
based on VIPer06X
(output referred to neutral)



- $V_{IN} = 90$ to 265 Vac
- $V_{OUT} = 12$ V
- $I_{OUT} = 140$ mA
- Efficiency = 82.6% @ 85 Vac (full load)

[DN0009](#)

STEVAL-ISA115V1 (*)

1.8 W buck converter
based on VIPer06XN
(output referred to neutral)



- $V_{IN} = 90$ to 265 Vac
- $V_{OUT} = 12$ V
- $I_{OUT} = 150$ mA

[AN4260 \(*\)](#)

STEVAL-ISA010V1

1.8 W super wide range
buck converter
based on VIPer16LN
(dual outputs referred to neutral)

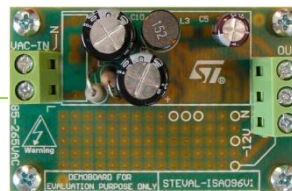


- $V_{IN} = 85$ to 500 Vac
- $V_{OUT1} = 12$ V
- $V_{OUT2} = 5$ V
- $I_{OUTtot} = 150$ mA
- Standby= 96 mW @ 230 Vac

[AN2872](#)

STEVAL-ISA096V1

2 W buck-boost converter
based on VIPer06XS
(negative output referred to neutral)



- $V_{IN} = 85$ to 264 Vac
- $V_{OUT} = -12$ V
- $I_{OUT} = 150$ mA
- Efficiency = 80% @ 230 Vac (full load)
- Standby < 30 mW @ 264 Vac

[UM1470](#)

STEVAL-ISA071V2

4 W non-isolated flyback converter
based on VIPer16L
(direct feedback, dual outputs
referred to neutral)



- $V_{IN} = 85$ to 264 Vac
- $V_{OUT1} = +7$ V
- $I_{OUT1} = 160$ mA
- $V_{OUT2} = -5$ V
- $I_{OUT2} = 400$ mA
- Standby = 35 mW @ 230 Vac

UM0920

STEVAL-ISA117V1 (*)

4.2 W isolated flyback converter
based on VIPer16LN
(secondary regulation)



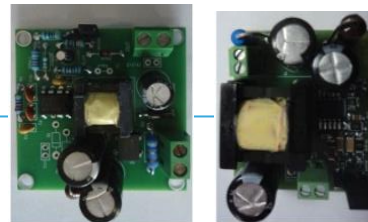
- $V_{IN} = 90$ to 265 Vac
- $V_{OUT} = 12$ V
- $I_{OUT} = 350$ mA

AN4259 (*)

STEVAL-ISA112V1

STEVAL-ISA113V1

4.2 W non-isolated flyback converter
based on VIPer06HN / VIPer06HS
(direct feedback)



- $V_{IN} = 90$ to 265 Vac
- $V_{OUT} = 12$ V
- $I_{OUT} = 350$ mA
- Efficiency 83% @ 115 V (full load)
- Standby < 28.5 mW @ 264 Vac

AN4116,
AN4164

STEVAL-ISA118V1

4.5 W non-isolated flyback converter
based on VIPer16LN
(direct feedback)

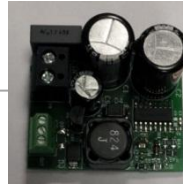


- $V_{IN} = 90$ to 265 Vac
- $V_{OUT} = 16$ V
- $I_{OUT} = 280$ mA
- Efficiency > 81% @ 230 Vac (full load)

AN3028

STEVAL-ISA116V1 (*)

5 W buck converter
based on VIPer26LD



- $V_{IN} = 85$ to 305 Vac
- $V_{OUT1} = 16$ V
- $V_{OUT2} = 5$ V
- $I_{OUT1} = 300$ mA
- $I_{OUT2} = 15$ mA

AN draft (*)

STEVAL-ISA110V1 (*)

STEVAL-ISA111V1
12 W non-isolated flyback converter
based on VIPer26LN
(direct feedback;
60 kHz, 115 kHz versions)



- $V_{IN} = 90$ to 265 Vac
- $V_{OUT} = 12$ V
- $I_{OUT} = 1$ A
- Average efficiency @ 115 Vac:
83.4% (115 kHz), 87% (60 kHz)

AN4106,
AN4165 (*)

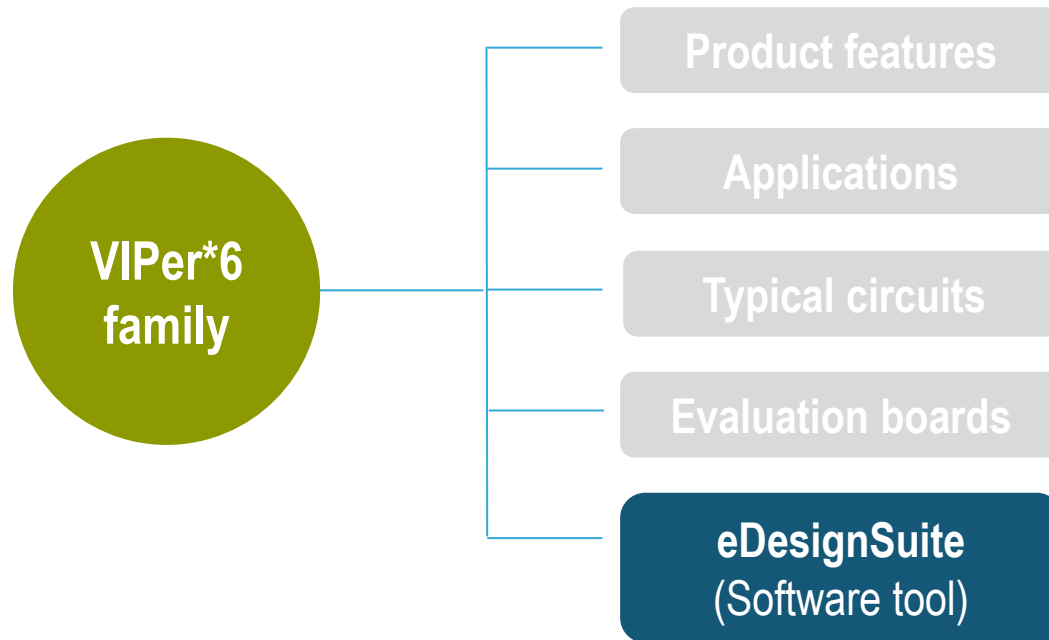
STEVAL-ISA081V1

12 W isolated flyback converter
based on VIPer16LND
(primary regulation)



- $V_{IN} = 85$ to 305 Vac
- $V_{OUT1} = 12$ V
- $V_{OUT2} = 3.3$ V
- $I_{OUT1} = 900$ mA
- $I_{OUT2} = 100$ mA
- Efficiency = 84% @ 230 Vac (full load)

UM0984



eDesignSuite enables VIPer*6 based design^(1/2)

eDesignSuite

The smart tool to design your application

Power Supply
DC/DC - AC/DC



LED Lighting
DC/DC - AC/DC



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Login to
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(online registering is required)

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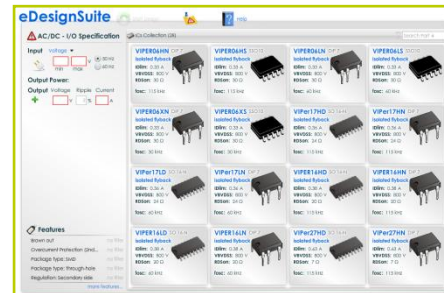
Fill in
eDesignSuite widget
(visit VIPer*6 product pages
on www.st.com)

or

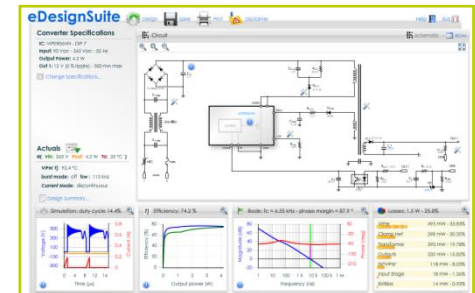
Open
eDesignSuite offline version
(ask your ST sales office to get it)



Choose *Power Supply*
application type
and create your design



Insert your I/O specifications and
select one of the proposed VIPer*6



The design is ready

1

2

3

4

A complete design in a few steps

www.st.com/edesign



eDesignSuite enables VIPer*6 based design^(2/2)

The specifications view

eDesignSuite

Converter Specifications

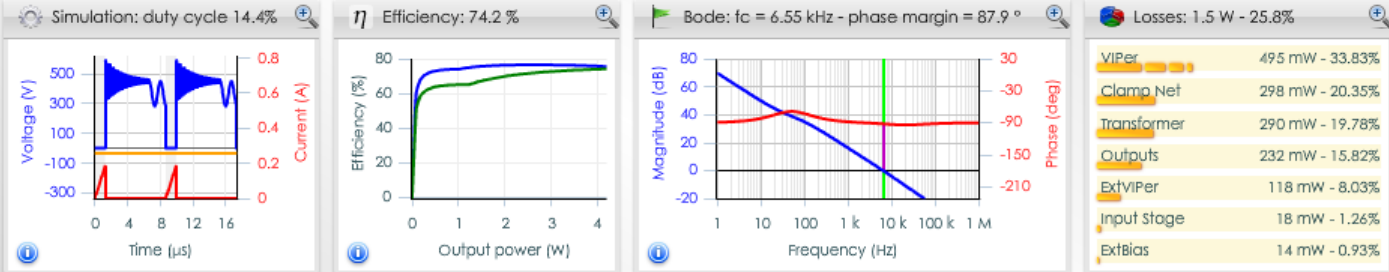
IC: VIPER06HN - DIP 7
Input: 90 Vac - 265 Vac - 50 Hz
Output Power: 4.2 W
Out 1: 12 V (2% ripple) - 350 mA max
[Change Specifications...](#)

The actuals view

Actuals

@ (Vin: 265 V Pout: 4.2 W Ta: 25 °C)
VIPer Tj: 92.4 °C
burst mode: off fsw: 115 kHz
Current Mode: discontinuous
[Design Summary...](#)

A full set of analysis diagrams



A full set of commands



Help Size

Schematic BOM

A fully interactive BOM

A fully annotated and interactive schematic

The user can customize the flyback transformer

The design view

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For more information

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[47132](#) [47220](#) [47225](#) [APR3415BMTR-G1](#) [NCP1126BP100G](#) [HF500GP-40](#) [TNY179PN](#) [ICE3AR10080JZXKLA1](#) [BM2P0361-Z](#)
[BM2P249Q-Z](#) [BM521Q25F-GE2](#) [INN3164C-H107-TL](#) [HR1001CGS-P](#) [HR1001LGS-P](#) [BM2P131X-Z](#) [BM2P161X-Z](#) [BM2P181X-Z](#)
[BM2P201X-Z](#) [BM2P241X-Z](#) [LNK576DG-TL](#) [INN3278C-H215-TL](#) [INN3278C-H217-TL](#) [INN3678C-H605-TL](#) [NCP1342BMDCCDD1R2G](#)
[AP3304AW6-7](#) [TNY263PN](#) [TNY286PG](#) [TNY287PG](#) [TNY288DG-TL](#) [TNY288PG](#) [MP100GN](#) [BP5034D24](#)