



HV Converters

Q2 / 2011

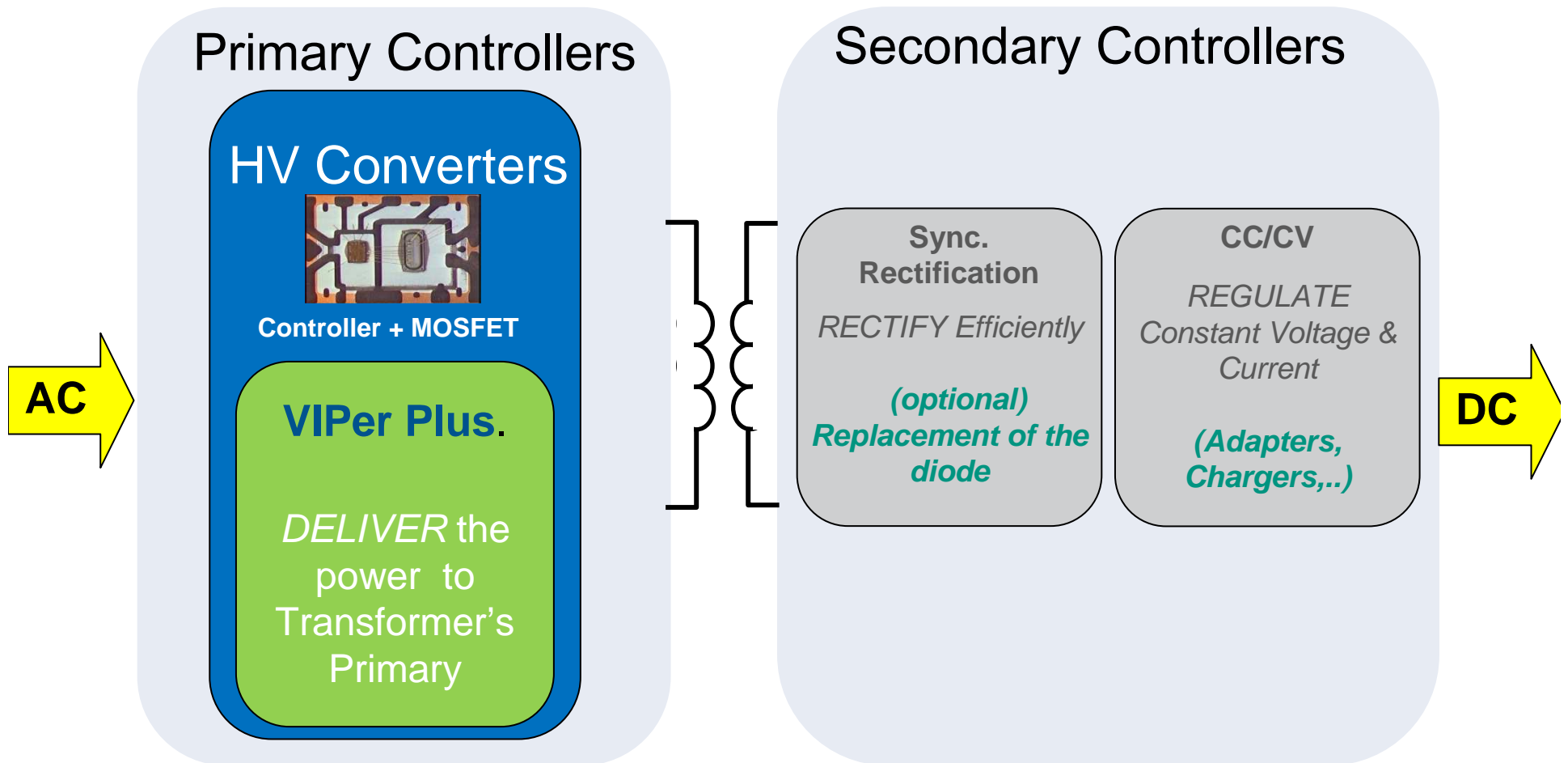
Industrial & Power Conversion Division
Off Line Power Supply Business Unit
HV Converters Segment Marketing



Solutions for low-medium power SMPS

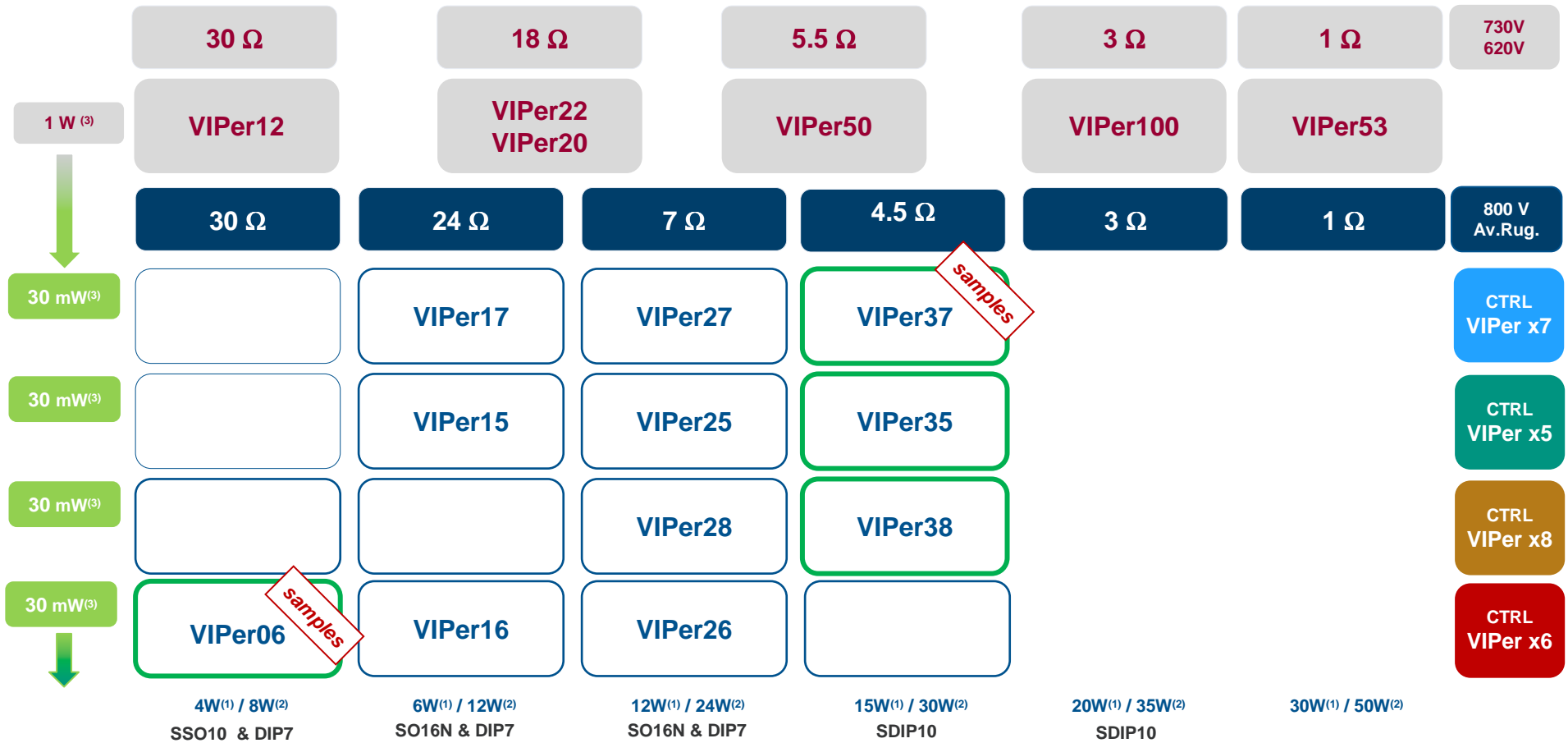
- The best energy saving approach
 - Minimized stand-by power
 - High efficiency
- The most reliable approach
 - Avalanche rugged power section
 - Integration of advanced protections
 - Thermal shutdown sensor located on power section
- The most flexible approach
 - Modular product: controller + power section
 - Packages' design and development
- The most profitable partner
 - Continuous products' innovation
 - Technical support (competence centers, documentations, software)
 - Excellence in quality and supply chain

Solutions for low-medium power SMPS



HV Converter Portfolio

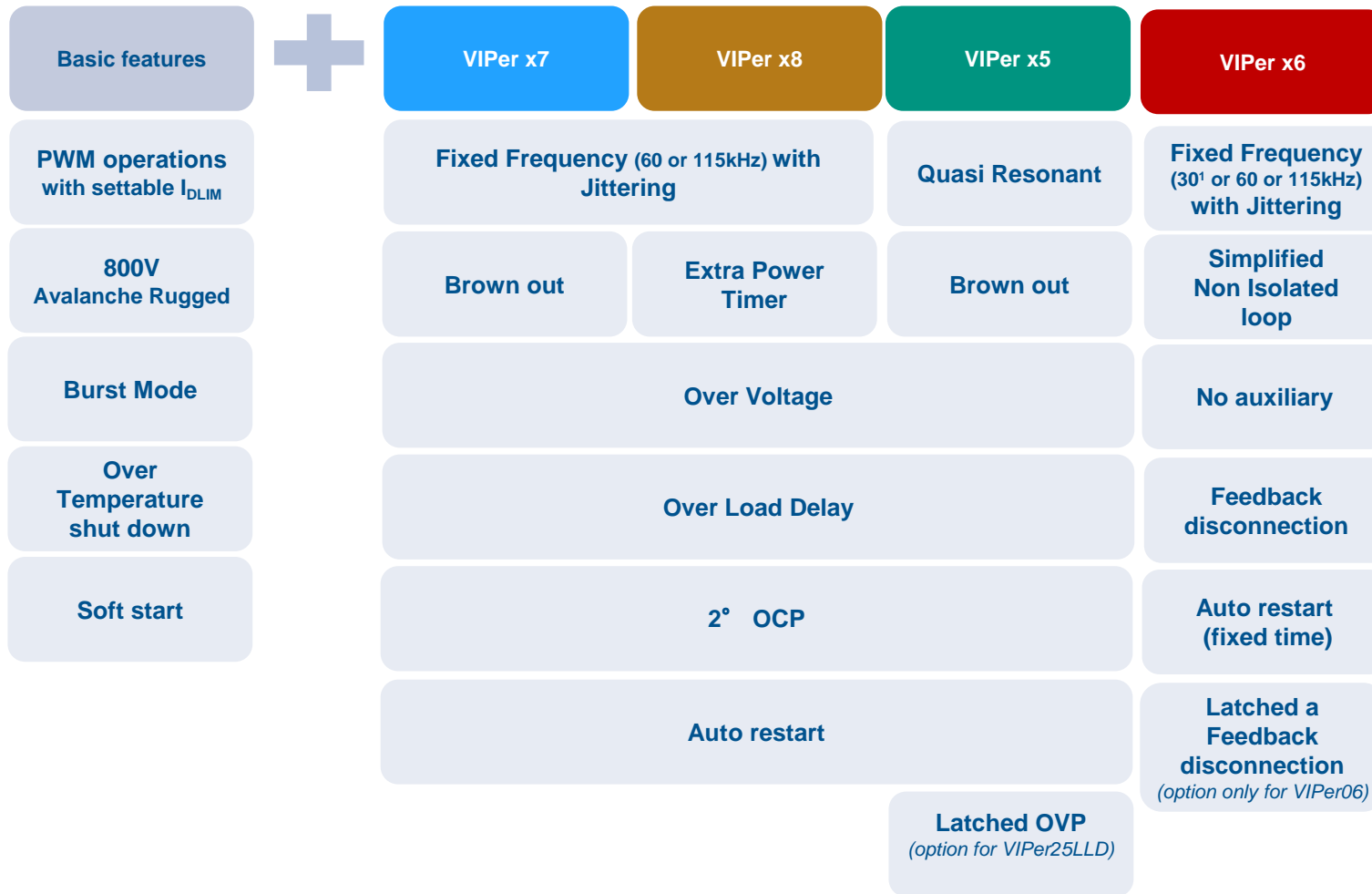
+ Roadmap



under development, SOP planned within 2011

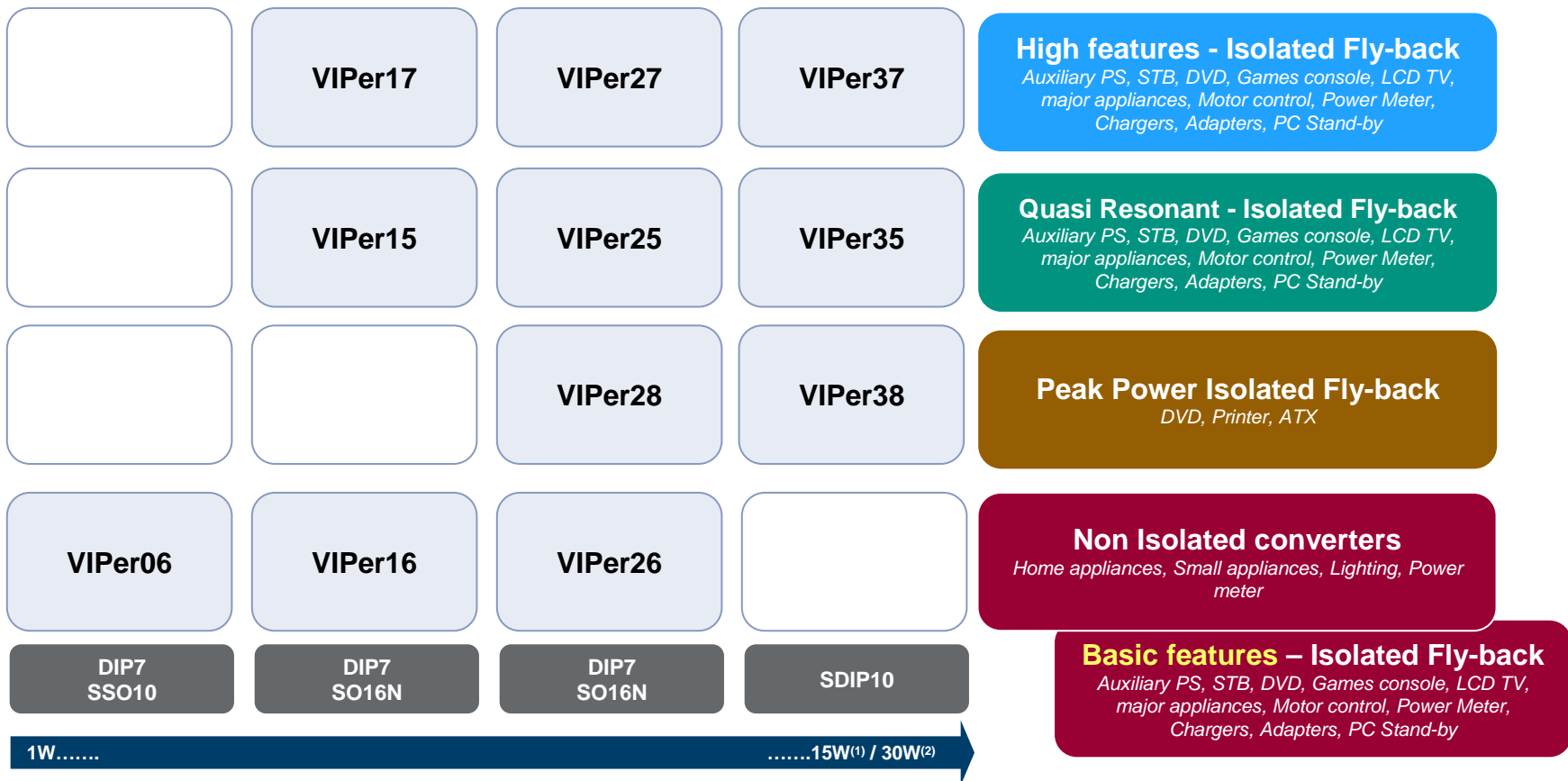
(1) Open frame, $V_{IN} = 85 - 264V_{AC}$,
 (2) Open frame, $V_{IN} = 230V_{AC} \pm 20\%$,
 (3) Achievable consumption at no load with $V_{in} 264V_{AC}$

Main features



(1) 30kHz available only for VIPer06

SMPS topology and main applications





Tools availability

	Datasheet	Training (slides)	Application Notes	Evaluation Boards	e-Design Studio	Spreadsheet	Spice Model
VIPer17	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VIPer27	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VIPer37	Preliminary	Yes	Under development	Under development	Under development	Under development	--
VIPer06	Preliminary	Yes	Under development	Under development	Under development	Under development	--
VIPer16	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VIPer26	Yes	Yes	Yes	Yes	Yes	Yes	--
VIPer15	Yes	Yes	Yes	Yes	Under development	Under development	--
VIPer25	Yes	Yes	Yes	Yes	Under development	Yes	--
VIPer28	Yes	Yes	Yes	Yes	Yes	Under development	-- .

Evaluation Boards and ANs



VIPer 17	Order code	Topology	Input VAC	Output	Output	Relevant AN	Reference
VIPER17LN	STEVAL-ISA058V1	Isolated Fly-back	85-265	5W	5V / 1A	AN2864	Stand-by PSU
VIPER17HN	STEVAL-ISA060V1	Isolated Fly-back	85-265	6W	12V / 0.5A	AN2753	Stand-by PSU
VIPER17HN	EVLVIP17-5WCHG	Isolated Fly-back	90-265	5W	5V / 1A	AN2840	Cell Phone Battery Charger
VIPER17HN	STEVAL-ILL017V1	Isolated Fly-back	220 ±20%	3.5W	7V / 500mA	AN2811	Led Driver
VIPER17HN	STEVAL-ISA062V1	Isolated Fly-back	85-265	5.5W	5V / 500mA 12V / 250mA	AN2934	General Purpose
VIPER17HN	EVLVIP27-7WLED	Isolated Fly-back	100-264	3.5W	10V / 350mA	AN3212	High Power Factor Led Driver
VIPer 27	Order code	Topology	Input VAC	Output	Output	Relevant AN	Reference
VIPER27LN	EVLVIP27L-12WS	Isolated Fly-back	85-265	12W	5V / 2.4A	AN2929	Auxiliary PSU
VIPER27HN	EVLVIP27H-12SB	Isolated Fly-back	85-265	11W	5V / 2.2A	AN3011	Auxiliary PSU
VIPER27HN	EVLVIP27-7WLED	Isolated Fly-back	100-264	7W	10V / 750mA	AN3212	High Power Factor Led Driver
VIPer 37	Order code	Topology	Input VAC	Output	Output	Relevant AN	Reference
VIPER37xx	TBD	Isolated Fly-back	85-265		5V / 3A		
VIPER37xx	TBD	Isolated Fly-back	85-265		12V / 1.3A		

Evaluation Boards and ANs



VIPer 06	Order code	Topology	Input VAC	Output	Output	Relevant AN	Reference
VIPER06LS VIPER06HS	Under development	Non isolated Fly-back	85-265		12V / 300mA option (5V /800mA)	TBD	Home appliance
	Under development	Isolated Fly-back	85-265		TBD	TBD	Home Appliance

VIPer 16	Order code	Topology	Input VAC	Output	Output	Relevant AN	Reference
VIPER16LN	STEVAL-ISA010V1	Non isolated buck converter	85-500	1.8W	12V / 5V (post reg.) / 150mA	AN2872	Power Meter
VIPER16LN	EVLVIP16L-4WFN	Non Isolated Fly-back	85-265	4.5W	16V / 280mA	AN3028 <i>draft</i>	Home appliance
VIPER16LN	STEVAL-ISA071V1	Non Isolated Fly-back	85-265	4W	- 5V / 400mA, +7V / 160mA	UM0920	Home appliance
VIPER16LN	EVLVIP16L-5WFL	Isolated Fly-back	85-265	5W	12 / 350mA	databrief	Home appliance Auxilaury PSU
VIPER16LD	EVLVIP16LD-1W5	Non Isolated buck converter	85-265	1.8W	12V / 5V (post reg.) / 150mA	databrief	Small Home Appliance
VIPER16HN	EVLVIP16H-4WFN	Non Isolated Fly-back	85-265	4.5W	16V / 280mA	databrief	Home appliance

VIPer 26	Order code	Topology	Input VAC	Output	Output	Relevant AN	Reference
VIPER26LD	STEVAL-ISA081V1	Primary Regulation Fly-back	85-265	12.5W	12V, 3.3V / 1A	UM0984	Home appliance

Evaluation Boards and ANs



VIPer 15	Order code	Topology	Input VAC	Output	Output	Relevant AN	Reference
VIPER15LN	STEVALVIP15L-6W	Quasi-Resonant Isolated Fly-back	90-265 VAC	6W	12V, 500mA	AN3160 <i>draft</i>	Auxiliary PSU
VIPER15LN	EVLVIP15L-5WSB	Quasi-Resonant Isolated Fly-back	90-265 VAC	5W	5V, 1A	TBD	Auxiliary PSU
VIPer 25	Order code	Topology	Input VAC	Output	Output	Relevant AN	Reference
VIPER25LN	EVLVIP25L-10WSB	Quasi-Resonant Isolated Fly-back	85-265 VAC	10W	5V, 2A	AN3286 <i>draft</i>	Auxiliary PSU STB Power Meter
VIPer 28	Order code	Topology	Input VAC	Output	Output	Relevant AN	Reference
VIPER28LN	EVLVIPER28L-10W	Isolated Fly-back	85-265 VAC	12W	5V, 2.4A	AN2950	Auxiliary PSU Printer

VIPer17 / 27 / 37



Main Features

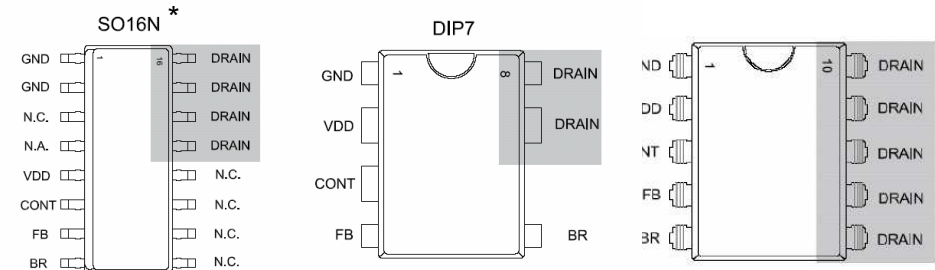
- 800V, avalanche rugged power MOSFET
- PWM controller with drain current limit, I_{Dlim} .
- Adjustable current limit, I_{Dlim}
- Fixed Frequency with Jittering
- High performance for stand-by & efficiency
- Integrated protections: OVP, OLP, high OCP
- Automatic auto restart after fault
- Hysteretic thermal shutdown
- Brown-out: minimum input voltage is settable

MAIN PARAMETERS	Power MOSFET (SuperMESH)	CONTROLLER (BCD6S)
Break down voltage [V]	800	
R_{DSon} [Ohm]	24 / 7 / 4.5	
V_{DD} [V]		9 ÷ 23
F_{OSC} [KHz]		60 or 115
Max I_{Dlim} [mA]		420 / 740 / 1050
R_{THJA} [° C/W] ⁽¹⁾		50
P_{OUT} [W] @ 85-265V _{AC}		6 / 12 / 15

(1) Package SO16N and 100mm² of Cu

(2) Open Frame

Pin description



- GND**
controller ground / power MOSFET Source
- VDD**
controller supply voltage / I_{CHARGE} output current
- CONT**
OVP set-up, I_{DLIM} set-up.
- FB**
current loop feedback
- BR***
brown out set-up
- N.A.**
Not Available for user. (It can be connected to GND)
- N.C.**
Not Connected

* BR pin has the position 10 for VIPER17LD/HD (SO16N package)

Main Features

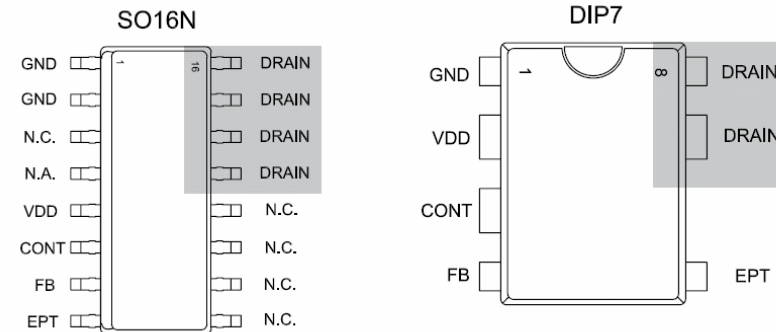
- 800V, avalanche rugged power MOSFET
- PWM controller with drain current limit, I_{Dlim} .
- Adjustable current limit, I_{Dlim}
- Fixed Frequency with Jittering
- High performance for stand-by & efficiency
- Integrated protections: OVP, OLP, high OCP
- Automatic auto restart after fault
- Hysteretic thermal shutdown
- Extra Power Management

MAIN PARAMETERS	Power MOSFET (SuperMESH)	CONTROLLER (BCD6S)
Break down voltage [V]	800	
R_{DSon} [Ohm]	7	
V_{DD} [V]		9 ÷ 23
F_{OSC} [KHz]		60 or 115
Max I_{Dlim} [mA]		850
R_{THJA} [° C/W] ⁽¹⁾		50
P_{OUT} [W] @ 85-265V _{AC}		12

(1) Package SO16N and 100mm² of Cu

(2) Open Frame

Pin description



- **GND**
controller ground / power MOSFET Source
- **VDD**
controller supply voltage / I_{CHARGE} output current
- **COMP**
OVP set-up, I_{DLIM} set-up.
- **FB**
current loop feedback
- **EPT**
Extra Power Time set-up
- **N.A.**
Not Available for user. (It can be connected to GND)
- **N.C.**
Not Connected

VIPer06 / 16 / 26



Main Features

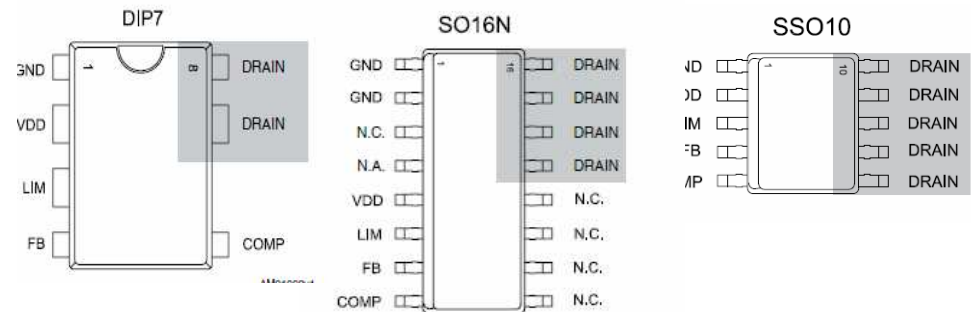
- 800V, avalanche rugged power MOSFET
- PWM controller with drain current limit I_{Dlim}
- Adjustable current limit, I_{Dlim}
- Fixed frequency with Jittering
- high performance for stand-by & efficiency
- No need of auxiliary winding
- Automatic auto restart after faults
- Hysteretic thermal shutdown
- Direct feedback for non isolated SMPS
- Replacement of capacitive power supply
- Open loop protection

MAIN PARAMETERS	Power MOSFET (SuperMESH)	CONTROLLER (BCD6S)
Break down voltage [V]	800	
R_{DSon} [Ohm]	30 / 24 / 7	
V_{DD} [V]		9 ÷ 23
F_{OSC} [KHz]		30 or 60 or 115
Max I_{Dlim} [mA]		420 / 740
R_{THJA} [° C/W] ⁽¹⁾		80
P_{OUT} [W] @ 85-265 V_{AC}		4 / 6 / 12

(1) Package SO16N, 100mm² of Cu

(2) Open Frame

Pin description



- GND**
controller ground / power MOSFET Source
- VDD**
controller supply voltage / I_{CHARGE} output current
- LIM**
Current limit set-up, I_{Dlim} .
- FB**
direct voltage feedback (in case of non isolated SMPS)
- COMP**
Compensation network.
Current loop feedback in case of isolated SMPS
- N.A.**
Not Available for user. (It can be connected to GND)
- N.C.**
Not Connected

VIPer15 / 25



Main Features

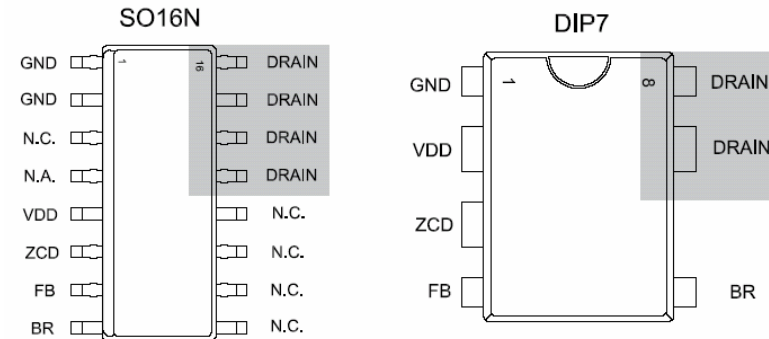
- 800V, avalanche rugged power MOSFET
- Quasi-Resonant PWM controller with drain current limit, I_{Dlim} .
- Adjustable current limit, I_{Dlim}
- Feed-Forward compensation
- High performance for stand-by & efficiency
- Integrated protections: OVP, OLP, high OCP
- Automatic auto restart after fault
- Hysteretic thermal shutdown
- Brown-out: minimum input voltage is settable

MAIN PARAMETERS	Power MOSFET (SuperMESH)	CONTROLLER (BCD6S)
Break down voltage [V]	800	
R_{DSon} [Ohm]	24 / 7	
V_{DD} [V]		9 ÷ 23
F_{OSClim} [KHz]		up to 150 (L type) up to 225 (H type)
Max I_{Dlim} [mA]		420 / 740
R_{THJA} [° C/W] ⁽¹⁾		80
P_{OUT} [W] @ 85-26 V_{AC}		6 / 12

(1) Package SO16N, 100mm² of Cu

(2) Open Frame

Pin description



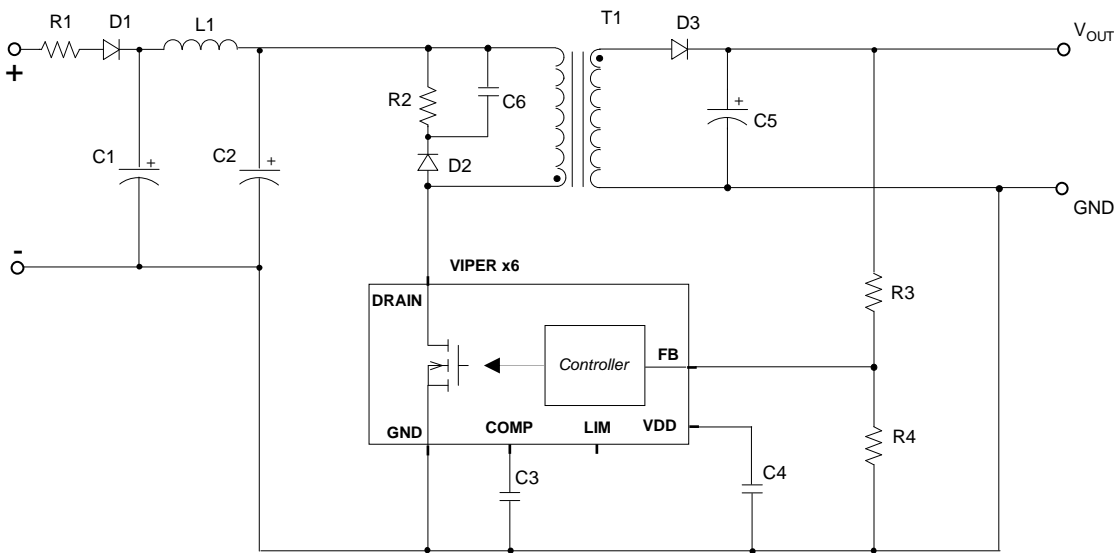
- GND**
controller ground / power MOSFET Source
- VDD**
controller supply voltage / I_{CHARGE} output current
- ZCD**
Zero Current Detection, Feed-Forward set-up, OVP set-up, I_{Dlim} set point.
- FB**
Current loop feedback
- BR**
Brown out set-up
- N.A.**
Not Available for user. (It can be connected to GND)
- N.C.**
Not Connected

Schematics with VIPerx6



VIPer06 / 16 / 26

FLY-BACK / Fixed Freq.
NON ISOLATED



Simplified feedback loop
R3, R4

No Need auxiliary winding
C4

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, D2, C6

Short circuit protection
(automatic restart)

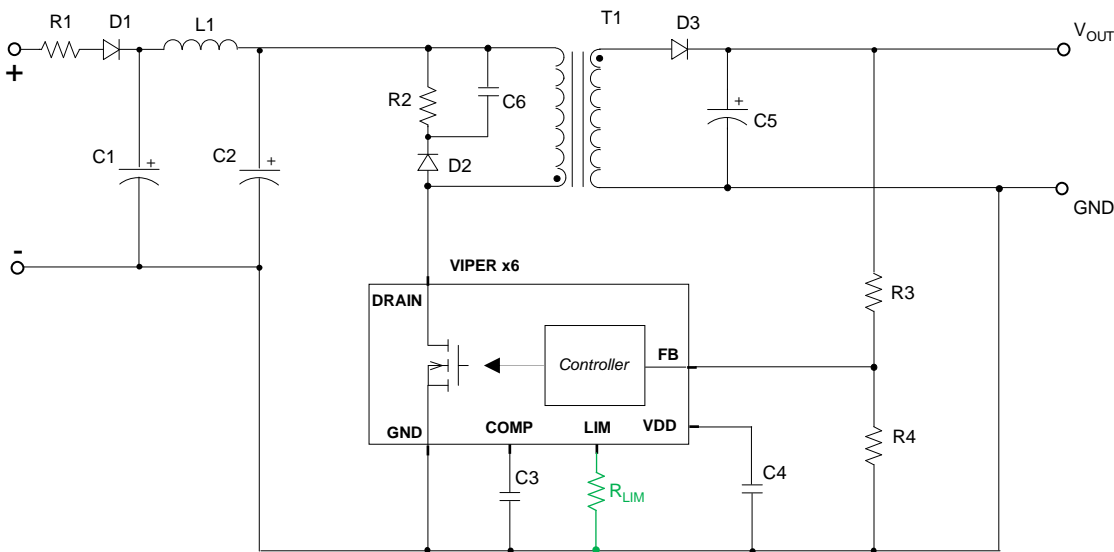
Default current limit
400mA / 700mA

Schematics with VIPerx6



VIPer06 / 16 / 26

FLY-BACK / FF
NON ISOLATED



Simplified feedback loop
R3, R4

No Need auxiliary winding
C4

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, D2, C6

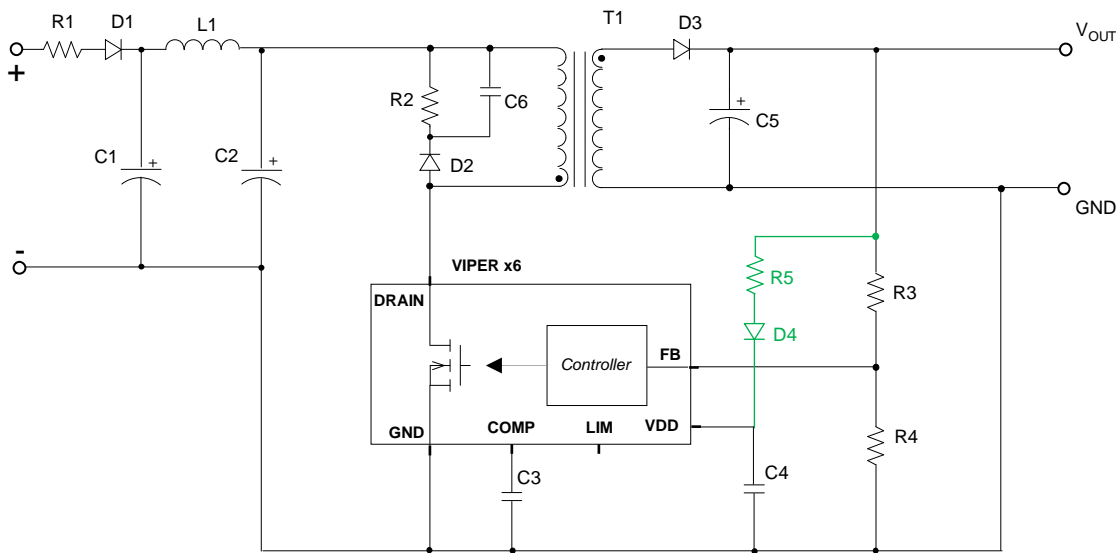
Short circuit protection
(automatic restart)

Current limit set-up - R_{LIM}
<400mA or <700mA

Schematics with VIPerx6



VIPer06 / 16 / 26



FLY-BACK / FF
NON ISOLATED

Simplified feedback loop
R3, R4

No Need auxiliary winding
C4

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, D2, C6

Short circuit protection
(automatic restart)

Feedback disconnection
(automatic restart)

Default current limit
400mA / 700mA

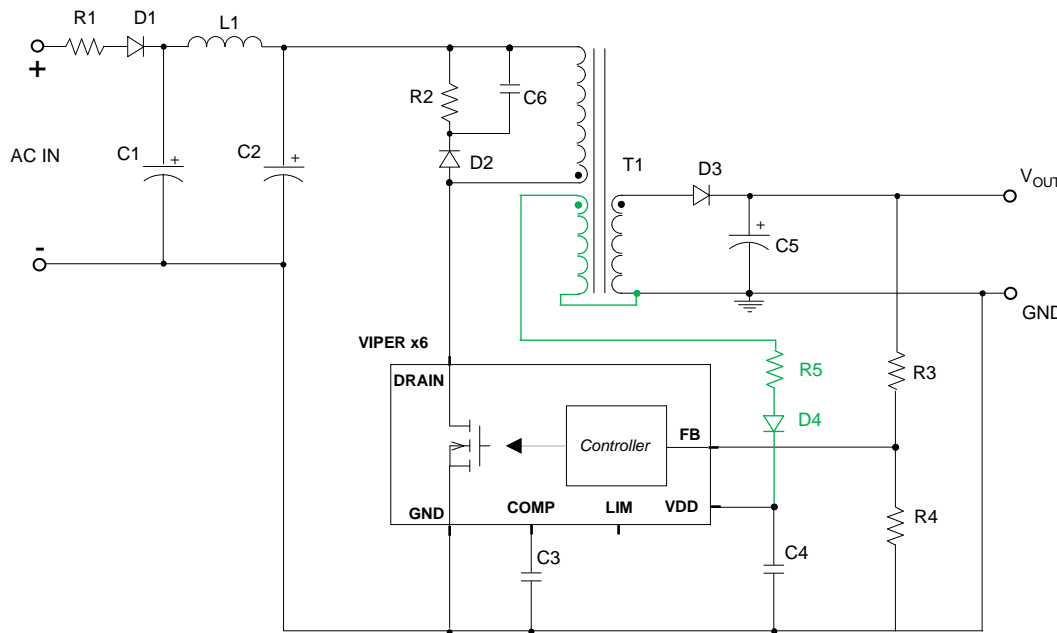
VOUT ≥ 12 V

Stand-by optimization , 30 mW
D4, R5

Schematics with VIPerx6



VIPer06 / 16 / 26



FLY-BACK / FF
NON ISOLATED

Simplified feedback loop
R3, R4

Need auxiliary winding
C4 + AUX

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, D2, C6

Short circuit protection
(automatic restart)

Feedback disconnection
(automatic restart)

Default current limit
400mA / 700mA

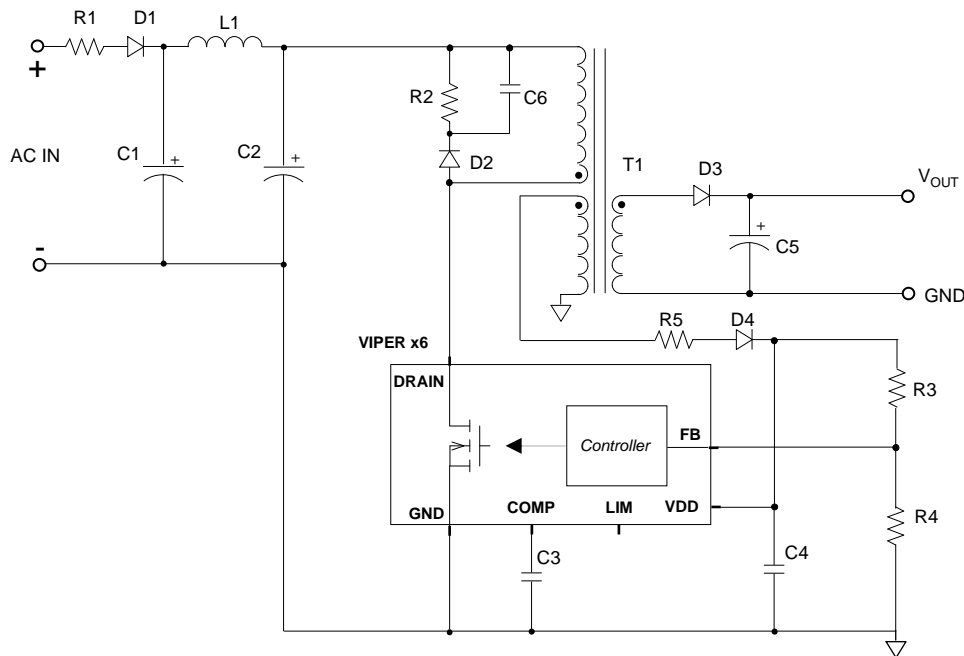
VOUT < 12 V

Stand-by optimization , 30 mW
D4, R5

Schematics with VIPerx6



VIPer06 / 16 / 26



**FLY-BACK / FF
PRIMARY
REGULATION**

**Simplified feedback loop
R3, R4**

**Need auxiliary winding
C4 + AUX**

**Low cost EMI filter
C1, C2, L1**

**Low cost clamp components
R2, D2, C6**

**Short circuit protection
(automatic restart)**

**Feedback disconnection
(automatic restart)**

**Default current limit
400mA / 700mA**

No need the optocoupler

**Stand-by optimization , 30 mW
D4, R5**

Schematics with VIPerx6



VIPer06 / 16 / 26

FLY-BACK / FF
ISOLATED

Minimum components count

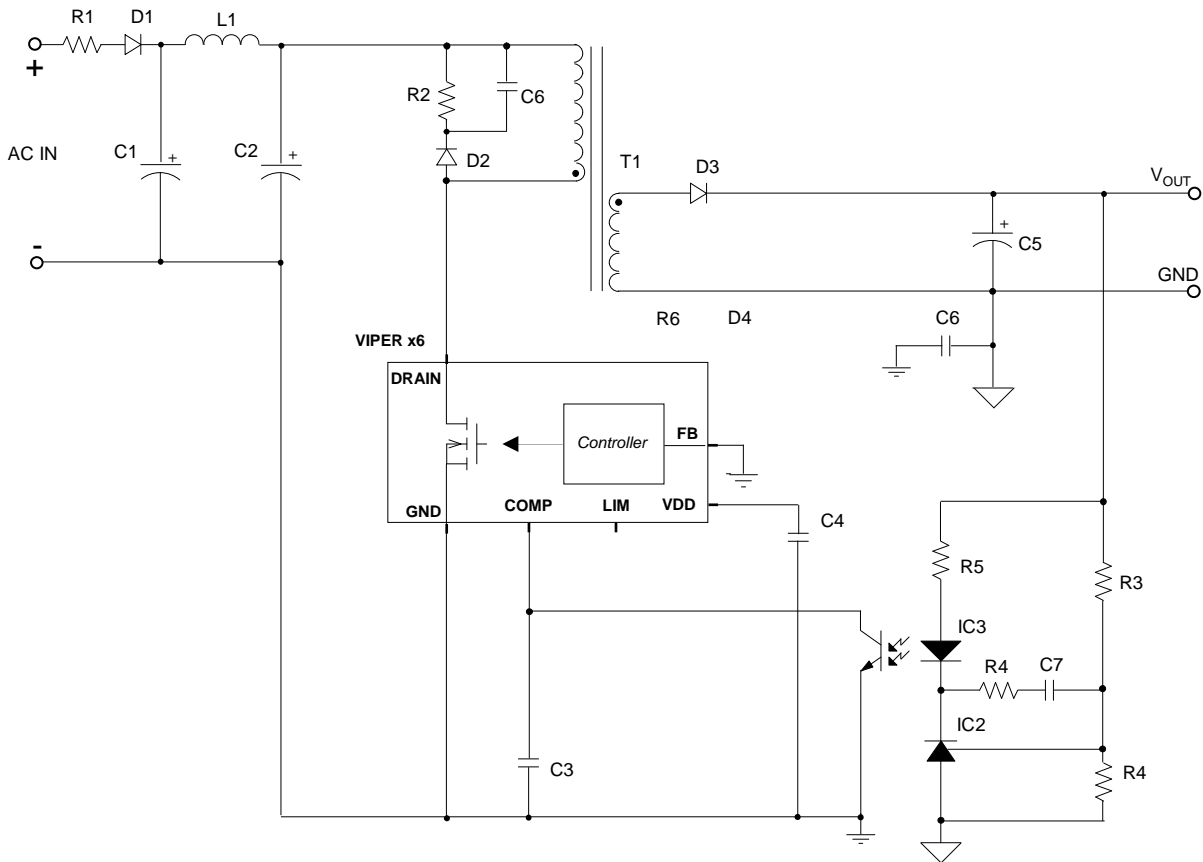
No Need auxiliary winding
C4

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2,D2,C6

Short circuit protection
(automatic restart)

Default current limit
400mA / 700mA



Schematics with VIPerx6



VIPer06 / 16 / 26

FLY-BACK / FF
ISOLATED

Minimum components count

Need auxiliary winding
C4 + AUX

Low cost EMI filter
C1, C2, L1

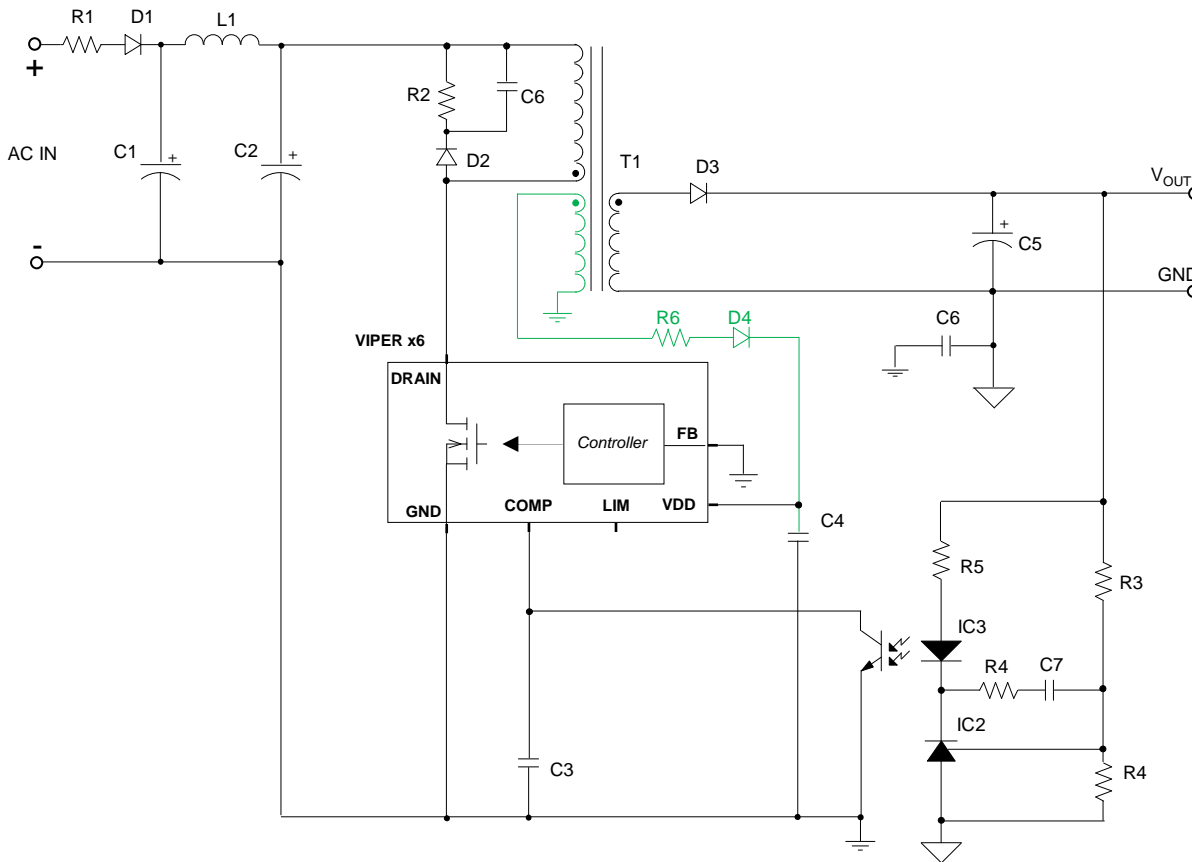
Low cost clamp components
R2, D2, C6

Short circuit protection
(automatic restart)

Feedback disconnection
(automatic restart)

Default current limit
400mA / 700mA

Stand-by optimization , 30 mW
AUX + D4, R5

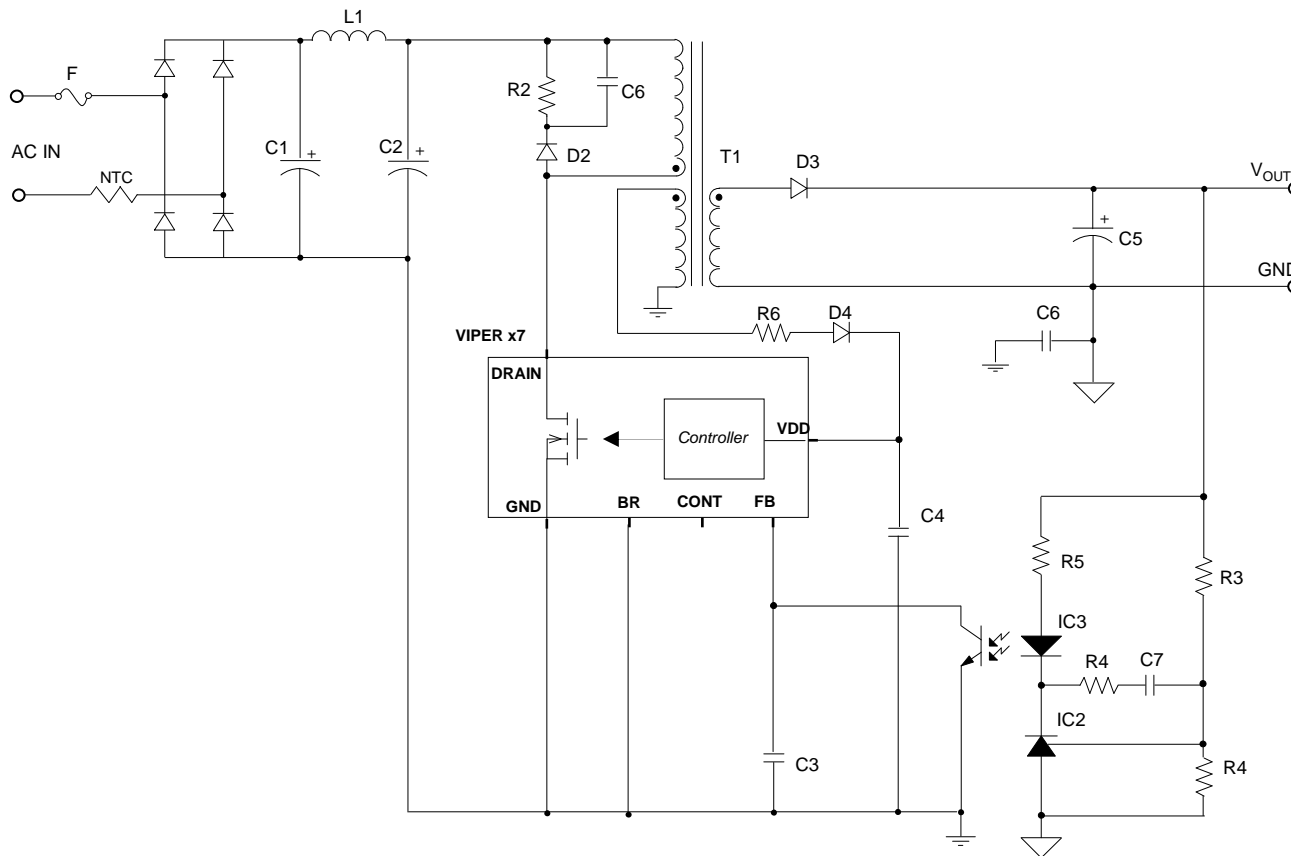


Schematics with VIPerx7



VIPer17 / 27 / 37

FLY-BACK / FF
ISOLATED



30mW Stand-by

Minimum components count

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, C6, D2

Default current limit
400mA / 700mA / 1000mA

Short circuit protection
No need ext components

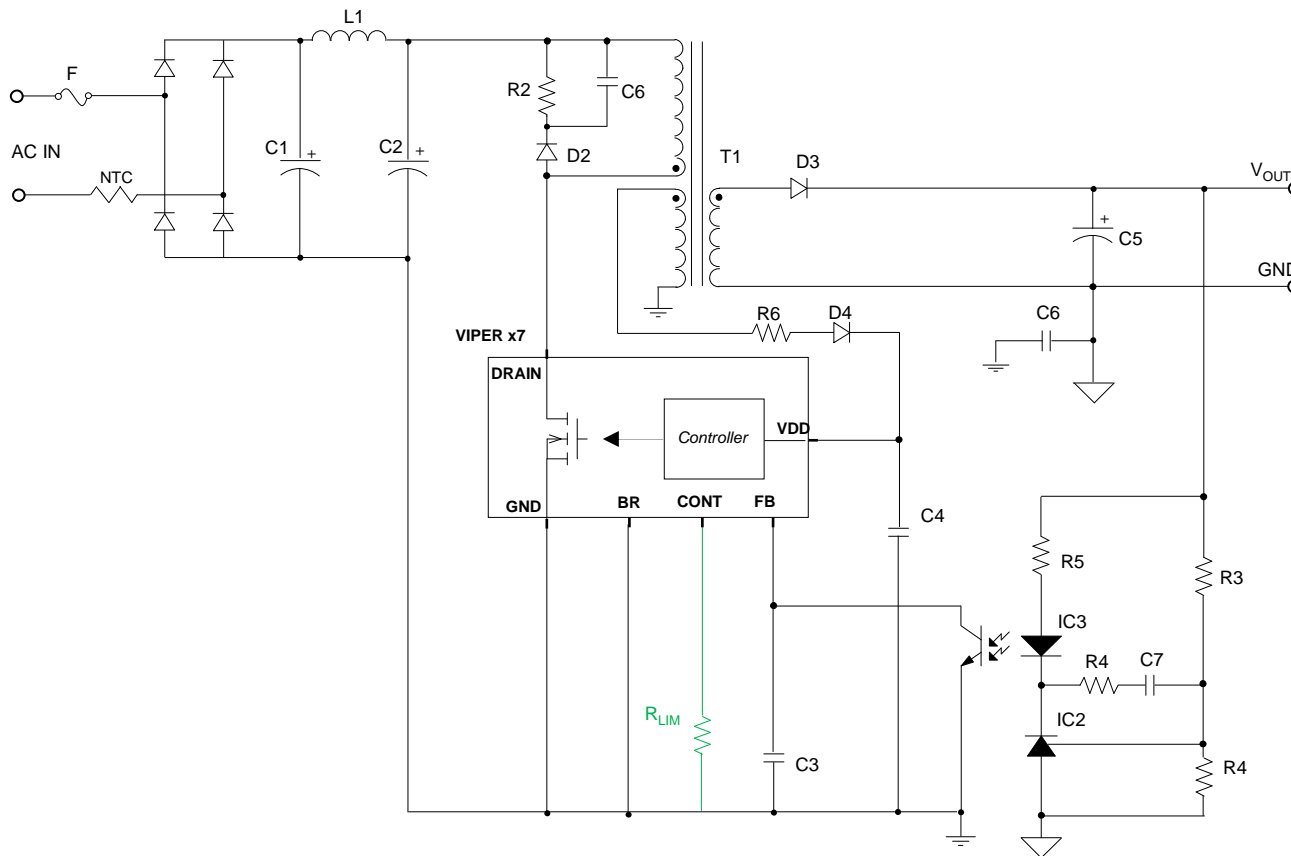
2nd Over Current protection
No need ext components

Schematics with VIPerx7



VIPer17 / 27 / 37

FLY-BACK / FF
ISOLATED



30mW Stand-by

Minimum components count

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, C6, D2

Current limit set-up - R_{LIM}
<400mA or <700mA or <1000mA

Short circuit protection
No need ext components

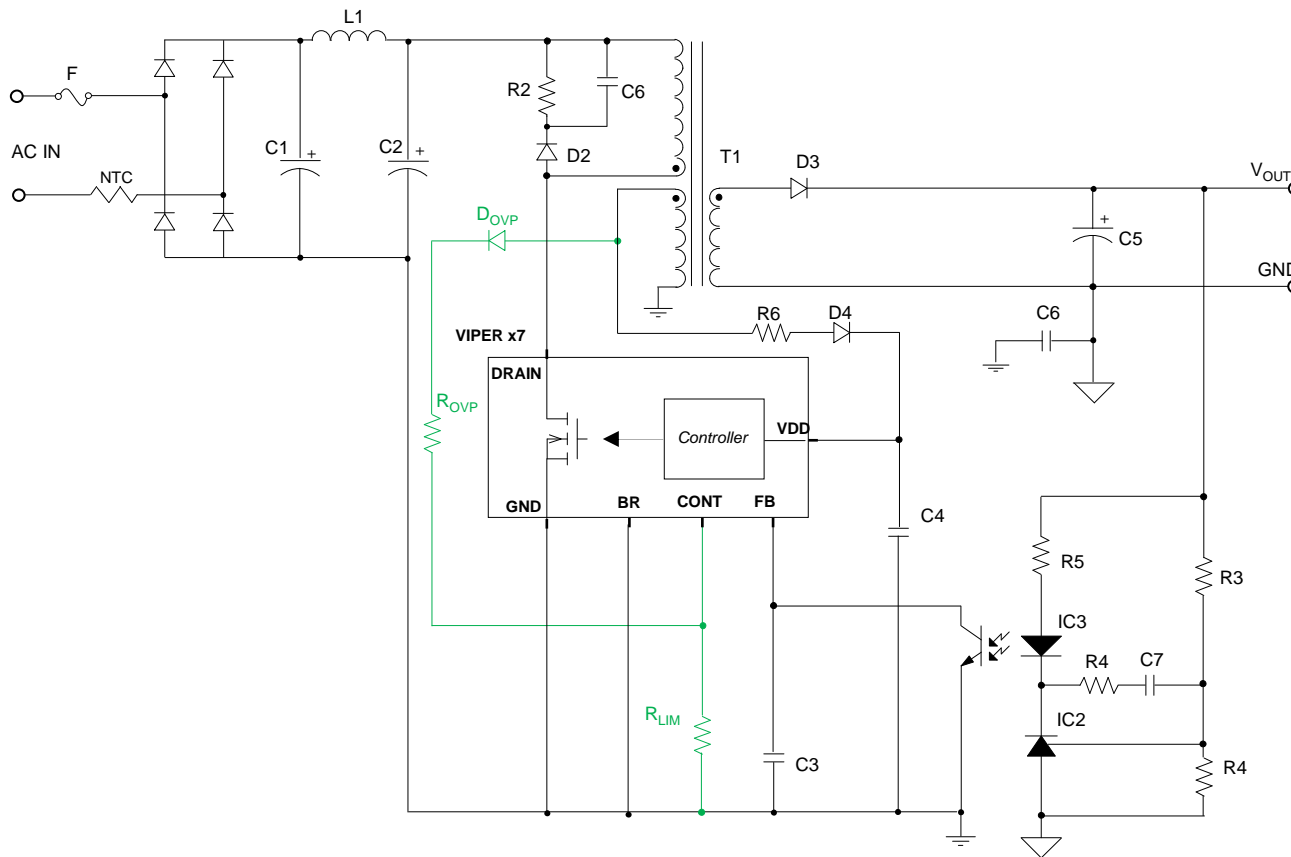
2nd Over Current protection
No need ext components

Schematics with VIPerx7



VIPer17 / 27 / 37

FLY-BACK / FF
ISOLATED



30mW Stand-by

Minimum components count

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, C6, D2

Current limit set-up - R_{LIM}
<400mA or <700mA or <1000mA

Short circuit protection
No need ext components

2nd Over Current protection
No need ext components

Over Voltage Protection
(V_{OUT})

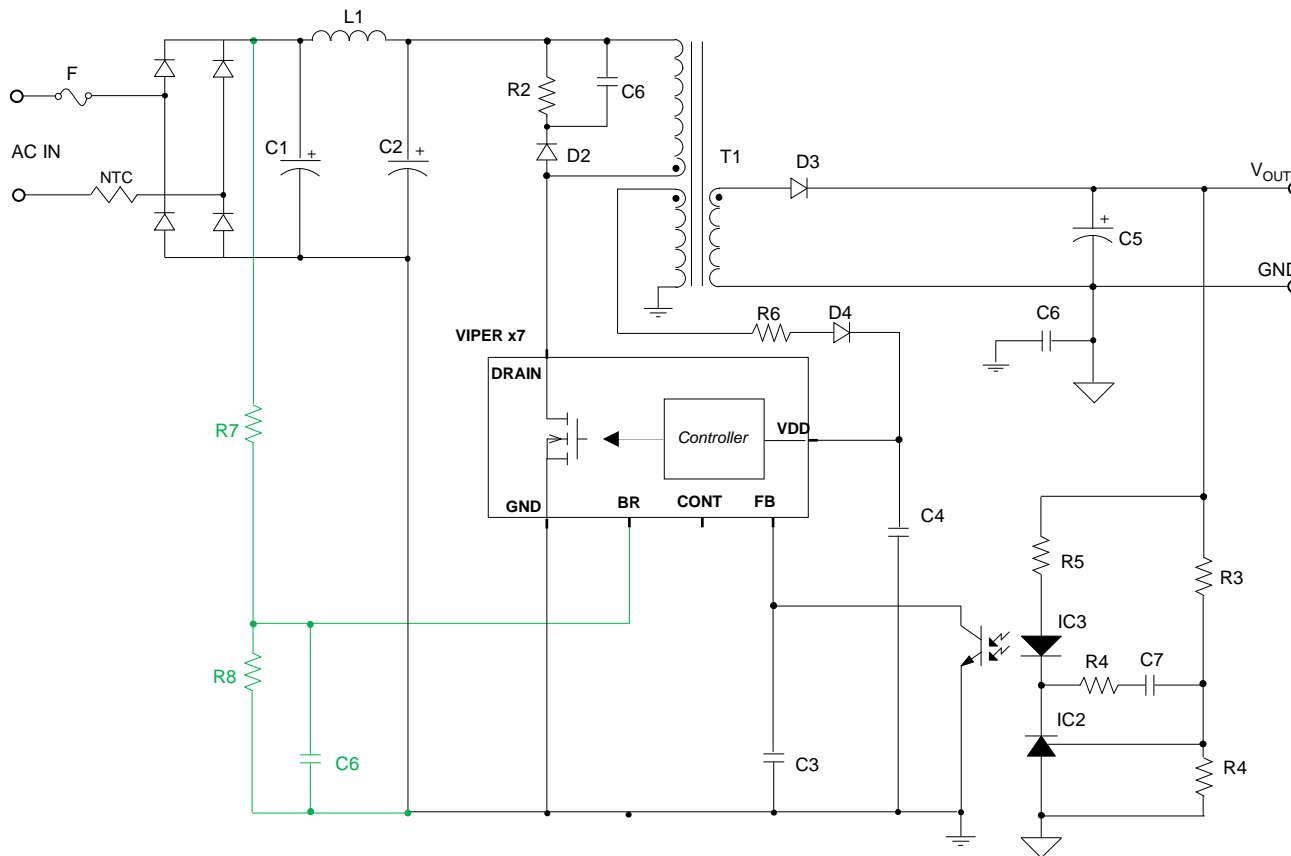
R_{LIM} , R_{OVP} , D_{OVP}

Schematics with VIPerx7



VIPer17 / 27 / 37

FLY-BACK / FF
ISOLATED



30mW Stand-by

Minimum components count

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, C6, D2

Default current limit
400mA / 700mA / 1000mA

Short circuit protection
No need ext components

2nd Over Current protection
No need ext components

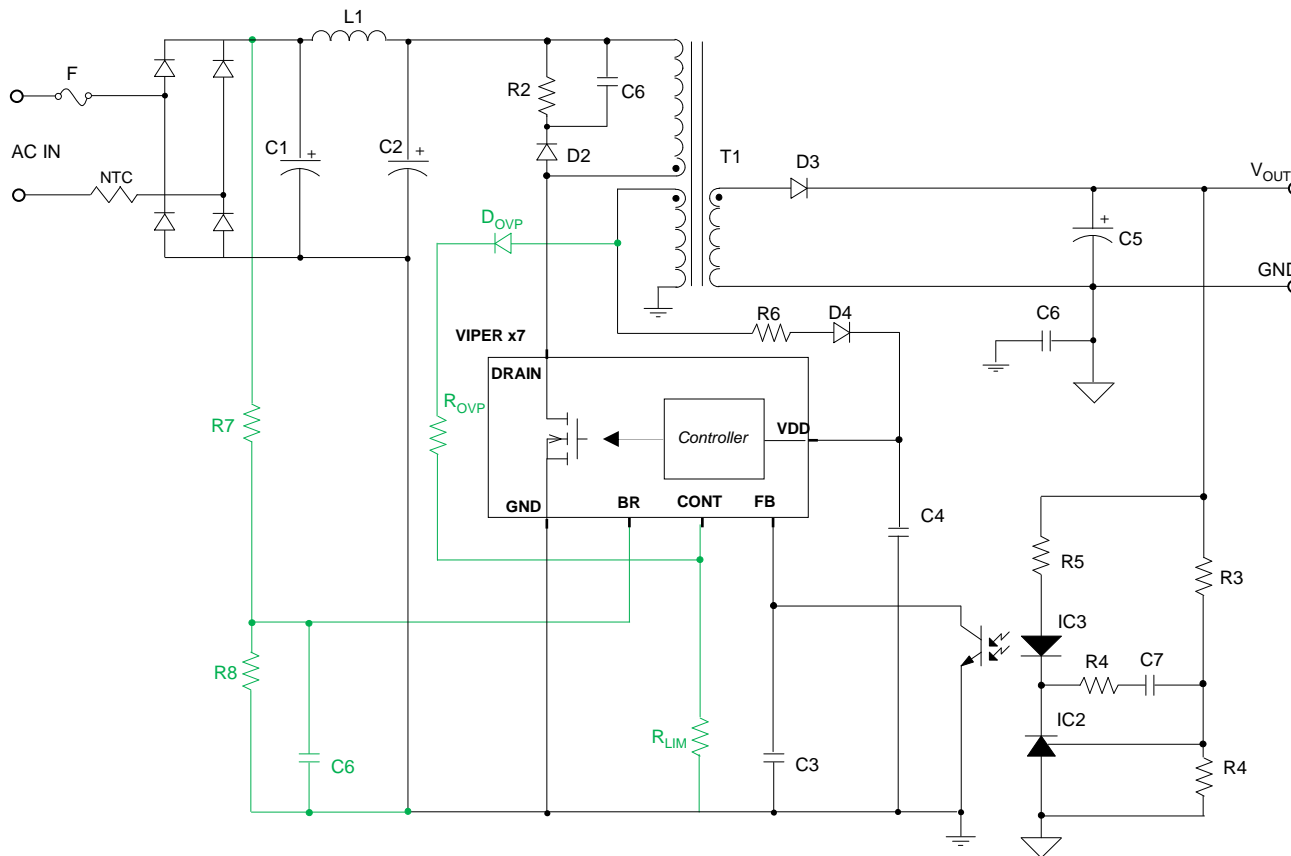
Brown out set-up (V_{INDC})
R7, R8, C6

Schematics with VIPerx7



VIPer17 / 27 / 37

FLY-BACK / FF
ISOLATED



30mW Stand-by

Minimum components count

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, C6, D2

Current limit set-up - R_{LIM}
<400mA or <700mA or <1000mA

Short circuit protection
No need ext components

2nd Over Current protection
No need ext components

Over Voltage Protection
(V_{OUT})

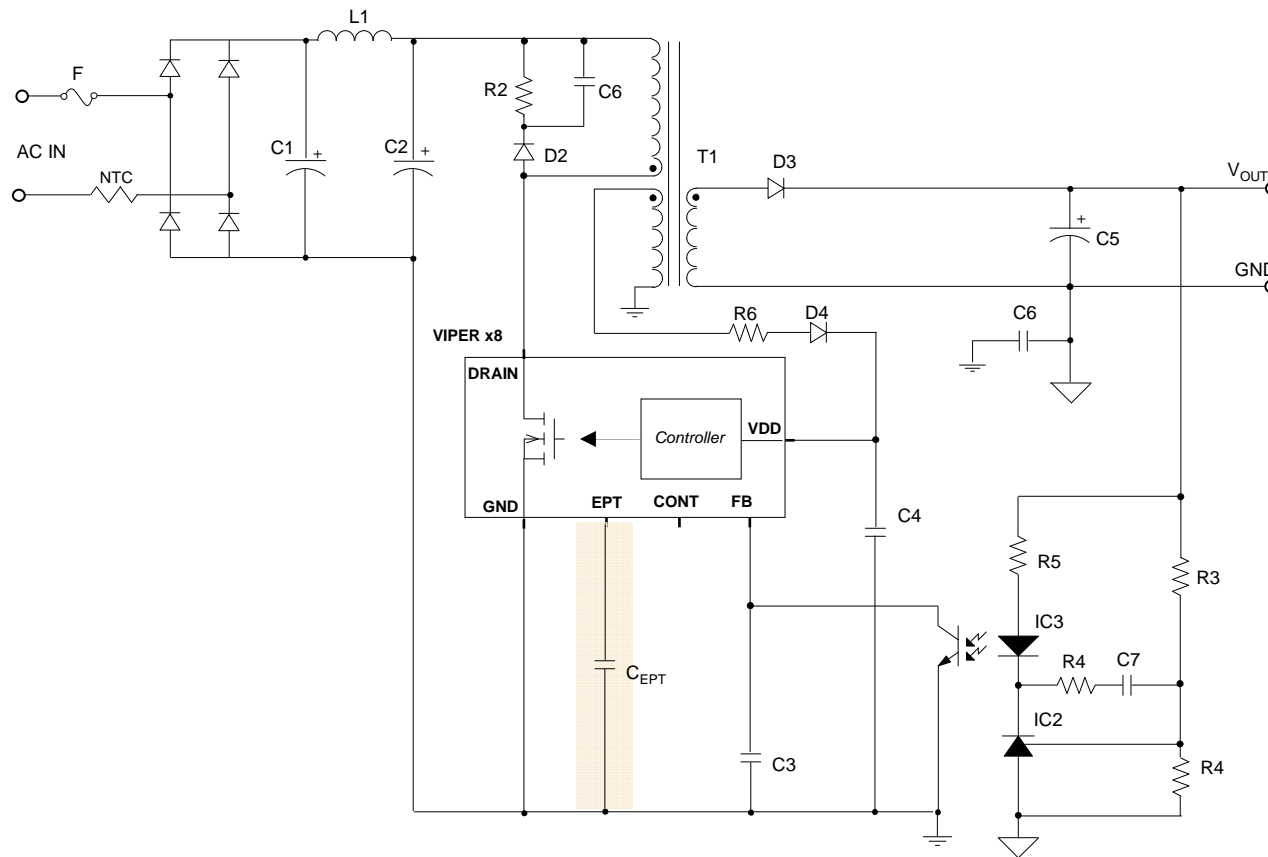
Brown out set-up (V_{INDC})
R7, R8, C6

Schematics with VIPerx8



VIPer28

FLY-BACK / FF
ISOLATED



30mW Stand-by

Minimum components count

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, C6, D2

Default current limit
400mA / 700mA / 1000mA

Short circuit protection
No need ext components

2nd Over Current protection
No need ext components

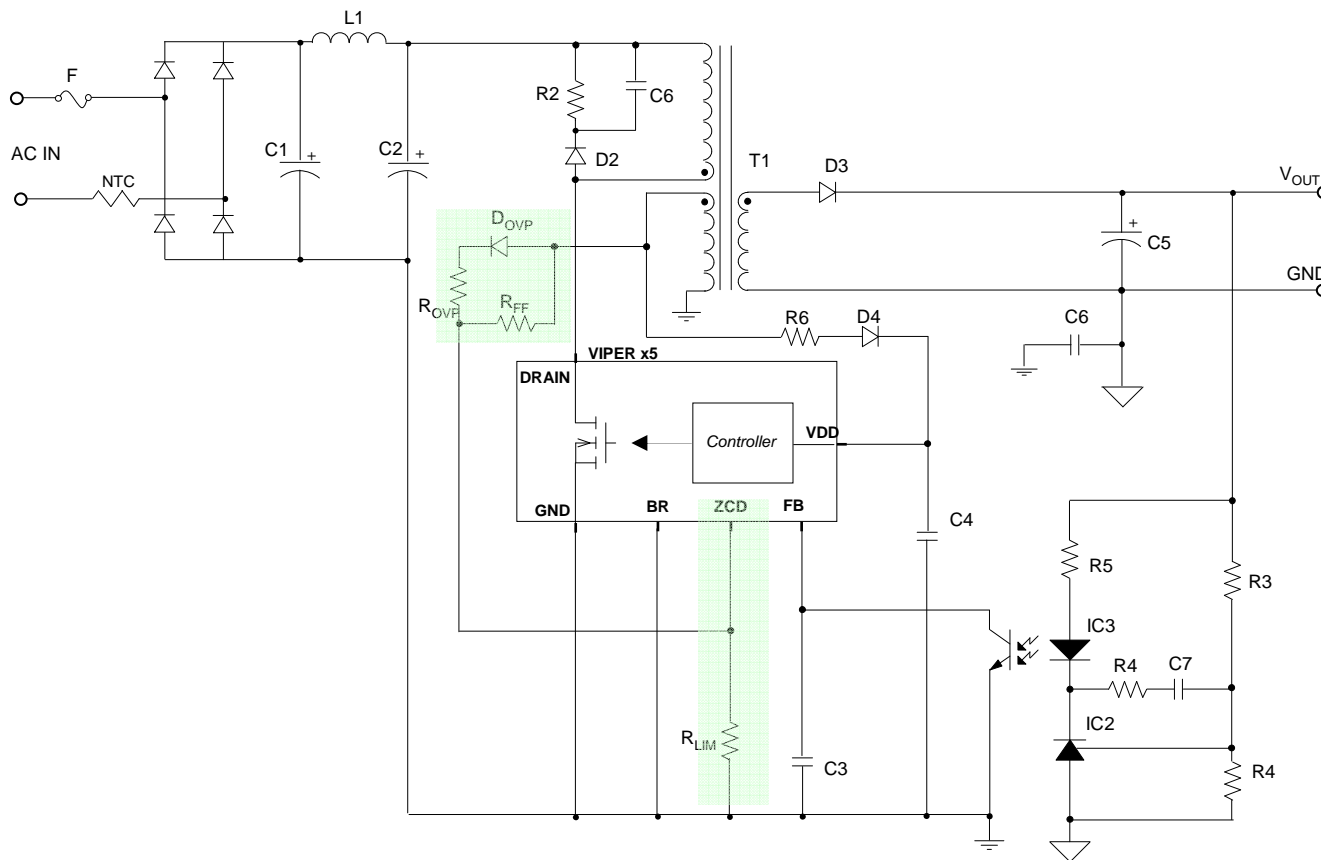
Extra Power Timer
C_{EPT}

Schematics with VIPer x5



VIPer15 / 25

FLY-BACK / Quasi Res.
ISOLATED



30mW Stand-by

Minimum components count

Low cost EMI filter
C1, C2, L1

Low cost clamp components
R2, C6, D2

Short circuit protection
No need ext components

2nd Over Current protection
No need ext components

Zero current Detection (QR)
 $R_{LIM}, R_{OVP}, D_{OVP}, R_{FF}$

Current limit set-up - R_{LIM}
 $\leq 400mA$ or $\leq 700mA$ or $\leq 1000mA$

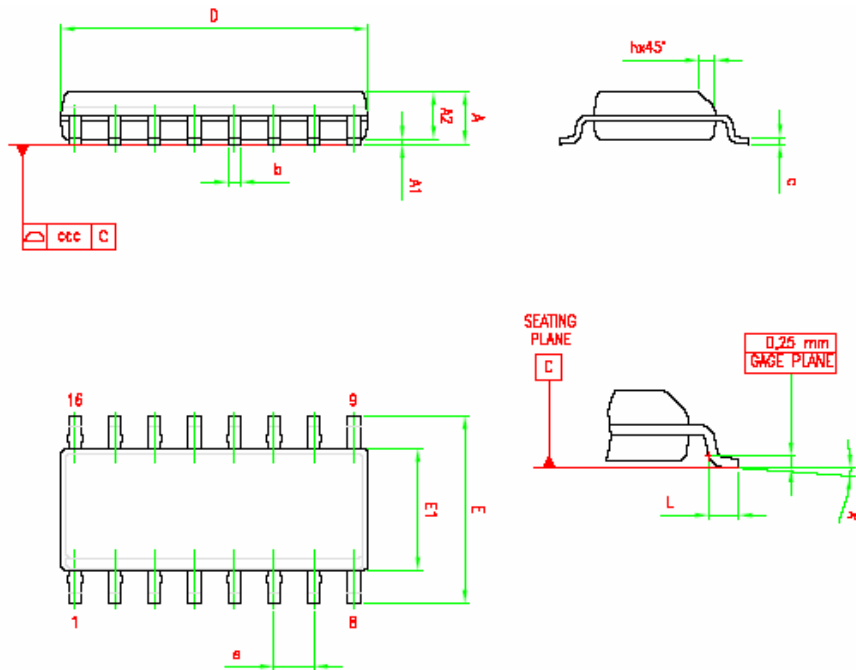
Over Voltage Protection
(V_{OUT})

$R_{LIM}, R_{OVP}, D_{OVP}$
Feed-Forward
 R_{FF}

VIPer Plus

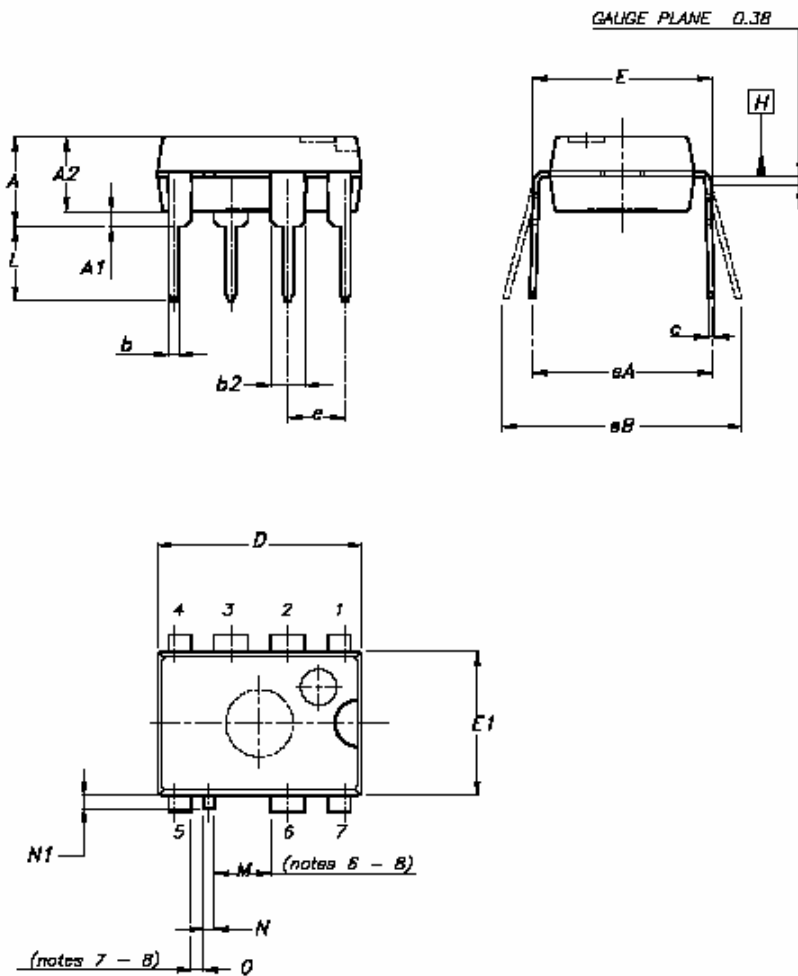
Packages mechanical data

SO16N package data



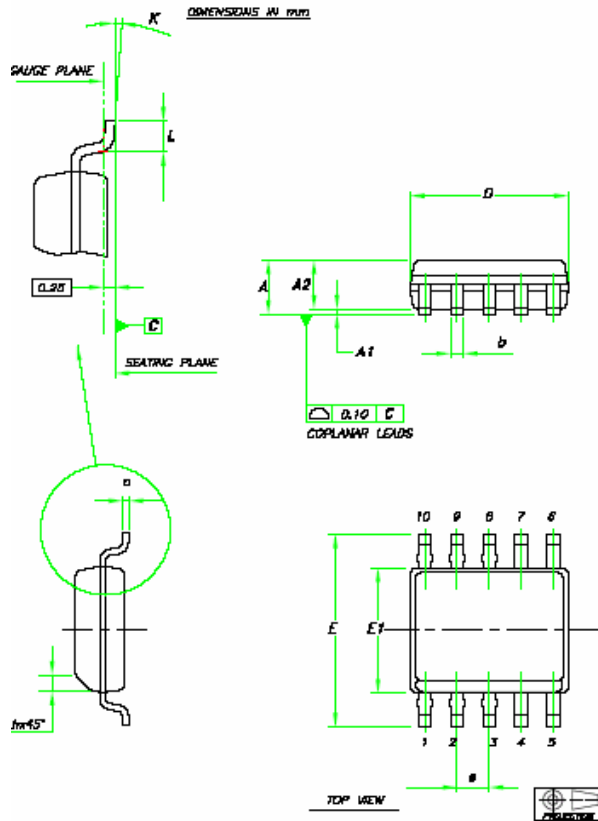
Dim.	mm		
	Min	Typ	Max
A			1.75
A1	0.1		0.25
A2	1.25		
b	0.31		0.51
c	0.17		0.25
D	9.8	9.9	10
E	5.8	6	6.2
E1	3.8	3.9	4
e		1.27	
h	0.25		0.5
L	0.4		1.27
k	0		8
occ			0.1

DIP7 package data



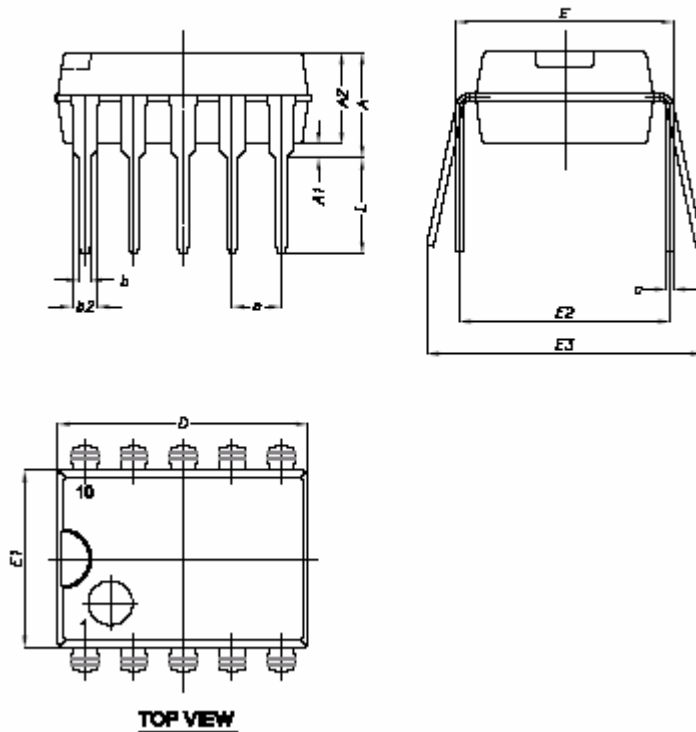
Dim.	mm		
	Typ	Min	Max
A			5.33
A1		0.38	
A2	3.30	2.92	4.95
b	0.46	0.36	0.56
b2	1.52	1.14	1.78
c	0.25	0.20	0.36
D	9.27	9.02	10.16
E	7.87	7.62	8.26
E1	6.35	6.10	7.11
e	2.54		
eA	7.62		
eB			10.92
L	3.30	2.92	3.81
M	2.508		
N	0.50	0.40	0.60
N1			0.60
O	0.548		

SSO10 package data



Dim.	Databook (mm.)		
	Min	Typ.	Max
A			1.75
A1		0.10	0.25
A2		1.25	
b		0.31	0.51
c		0.17	0.25
D	4.90	4.80	5
E	6	5.80	6.20
E1	3.90	3.80	4
e	1		
h		0.25	0.50
L		0.40	0.90
K		0°	8°

SDIP10 package data



Dim.	mm		
	Min.	Typ.	Max.
A			5.33
A1	0.38		
A2	2.92		4.95
b	0.36		0.56
b2	0.51		1.15
c	0.2		0.36
D	9.02		10.16
E	7.62		8.26
E1	6.1		7.11
E2		7.62	
E3			10.92
e		1.77	
L	2.92		3.81


```
ERROR: syntaxerror
OFFENDING COMMAND: --nostringval--
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STACK:
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/Title
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```
/Subject
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(D:20110527122954+08'00')
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/ModDate
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()
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/Keywords
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(PDFCreator Version 0.9.5)
```

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/Creator
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(D:20110527122954+08'00')
```

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/CreationDate
```

```
(david huang)
```

```
/Author
```

```
-mark-
```