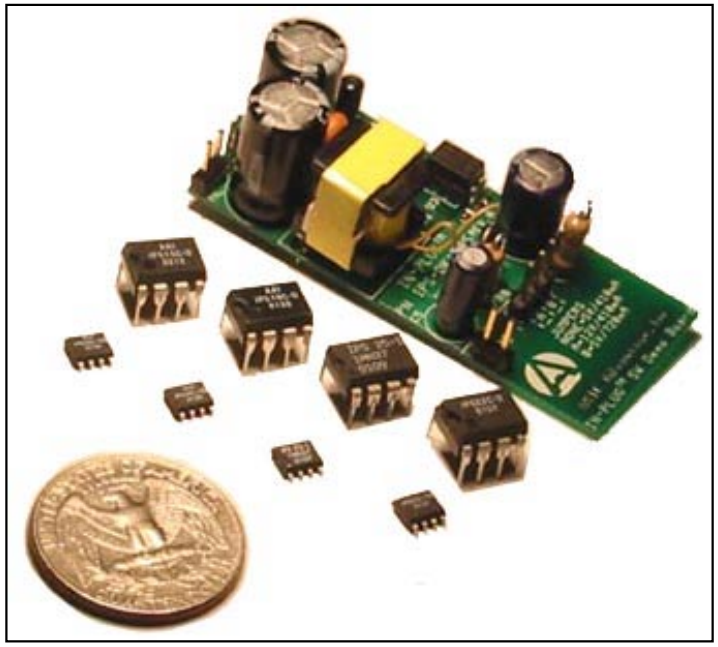
ASIC Advantage INC.

IN-PLUG® TECHNOLOGIES
for off-line Switching Mode Power Supplies



http://www.in-plug.com

What Does IN-PLUG® IN-PLY?

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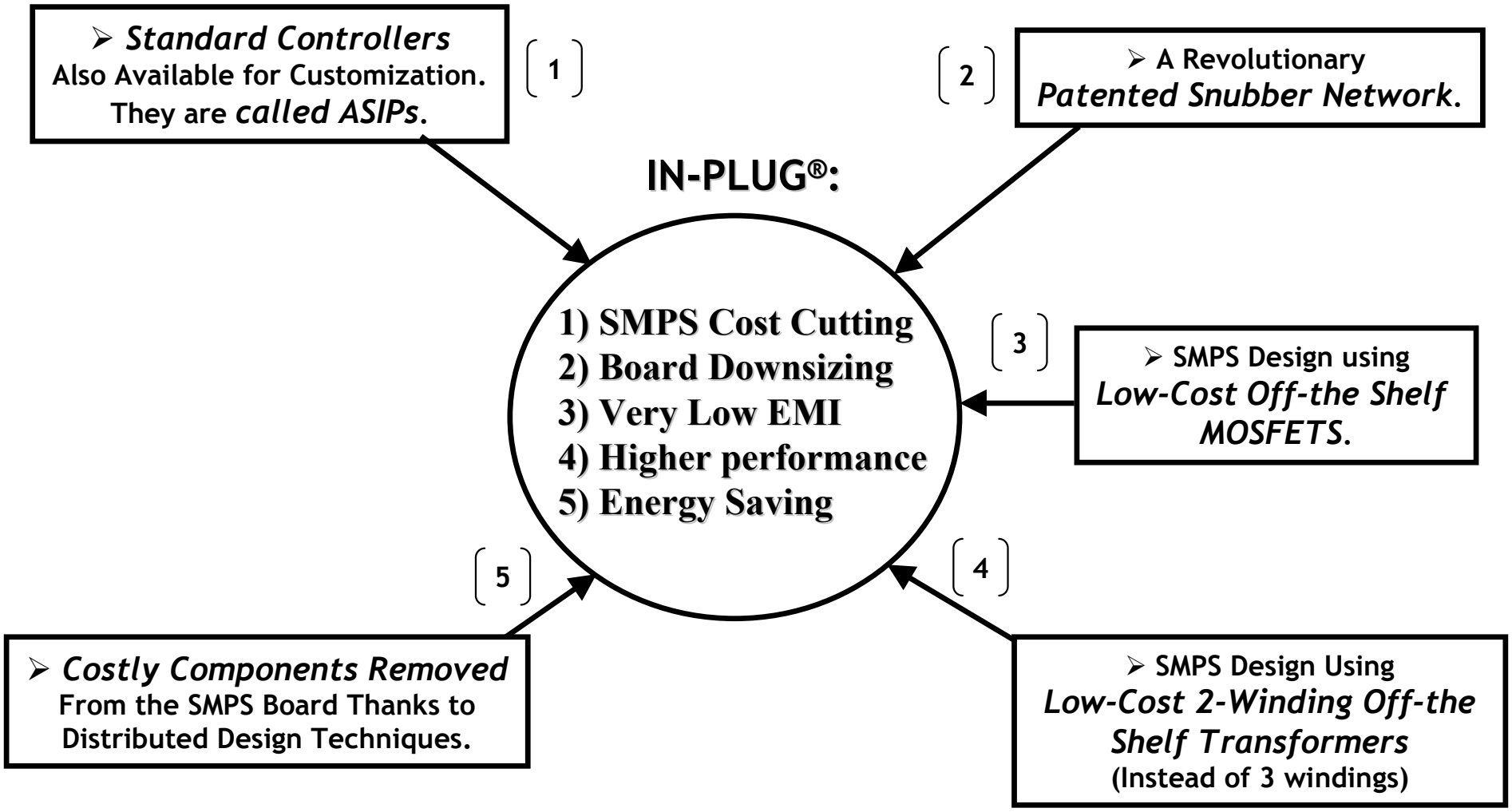

IN-PLUG® is a Registered Trademark since November 1999

IN-PLUG®: SMPS Basic Elements

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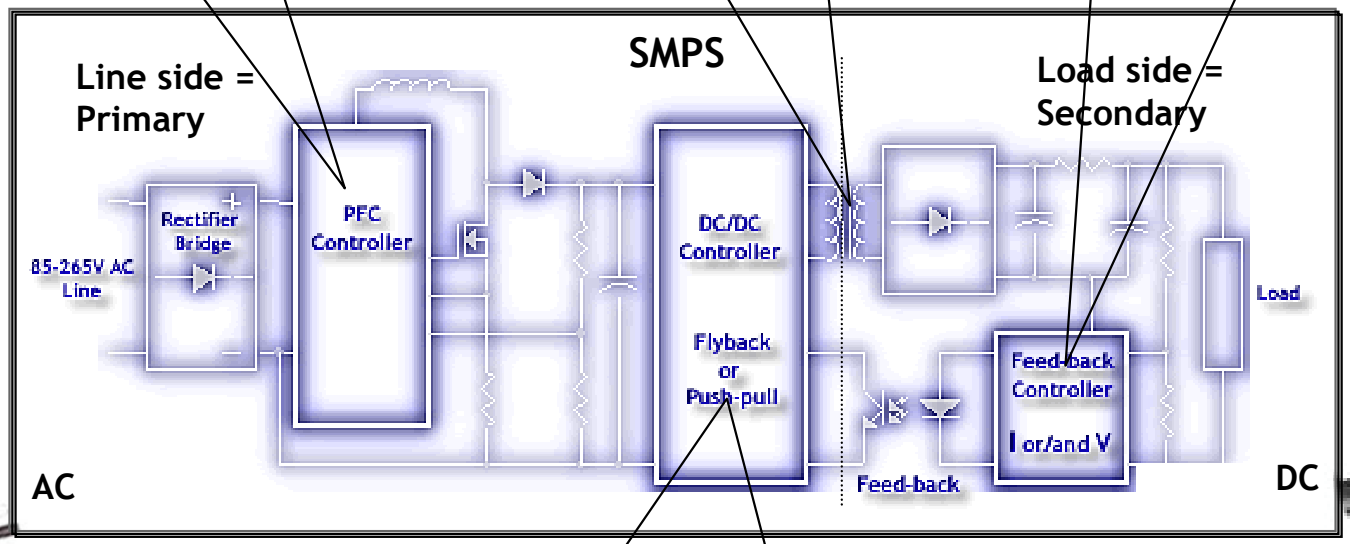
Ensures smooth loading of the AC line when required by law

Transfers the energy to the secondary and isolates the primary from the secondary

Senses the output voltage / current and feeds the information back to the primary



AC Mains Line

Controls the energy transfer to the secondary through the transformer taking into account the AC voltage and the feedback information

DC Output Jack

IN-PLUG®: ASIP Standard Family

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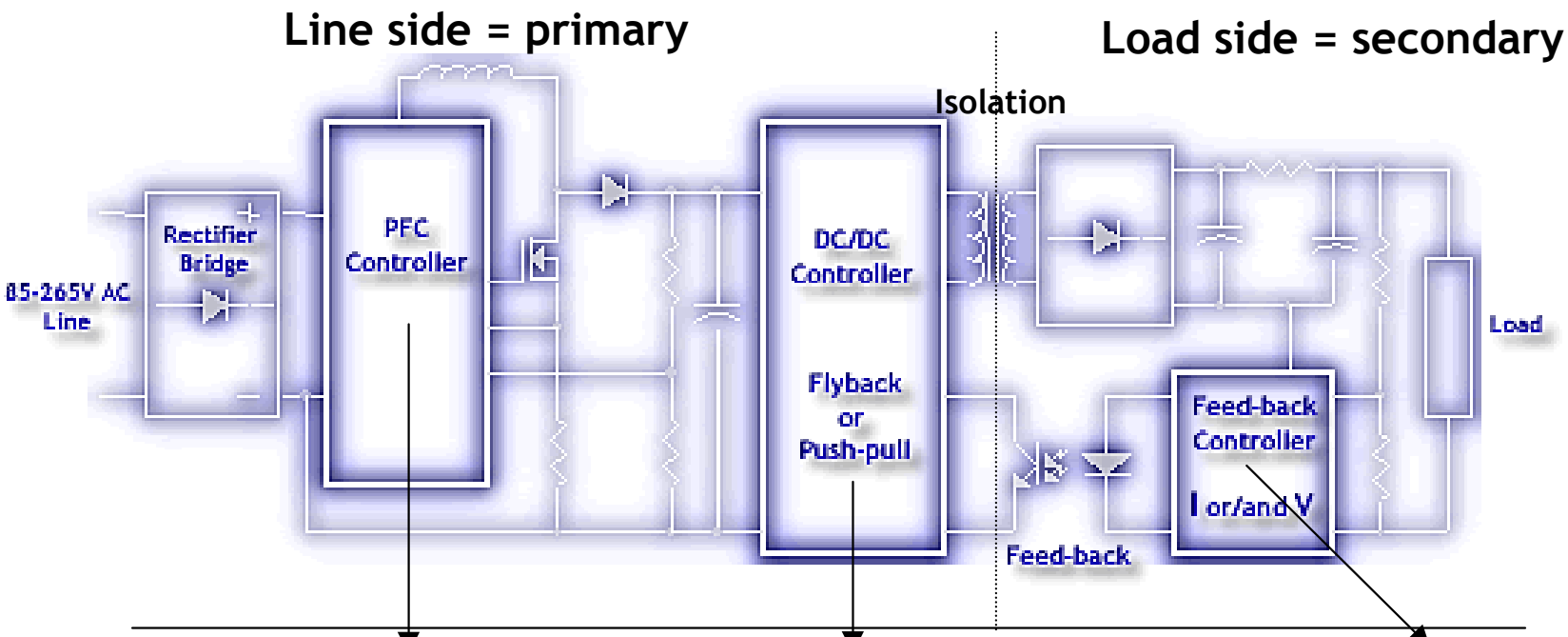

➢ Available Today

IPS101: PFC Controller

IPS10, IPS15, IPS15H & IPS18 Flyback Controllers

IPS22 & IPS25: Feedback Controllers

➢ Available Mid-2003

IPS15H, IPS17& 18: Flyback Controllers

IPS201: Push-Pull Controller

IN-PLUG®: AAI's Patented Snubber Network

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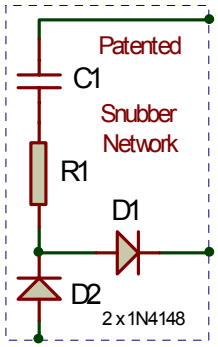
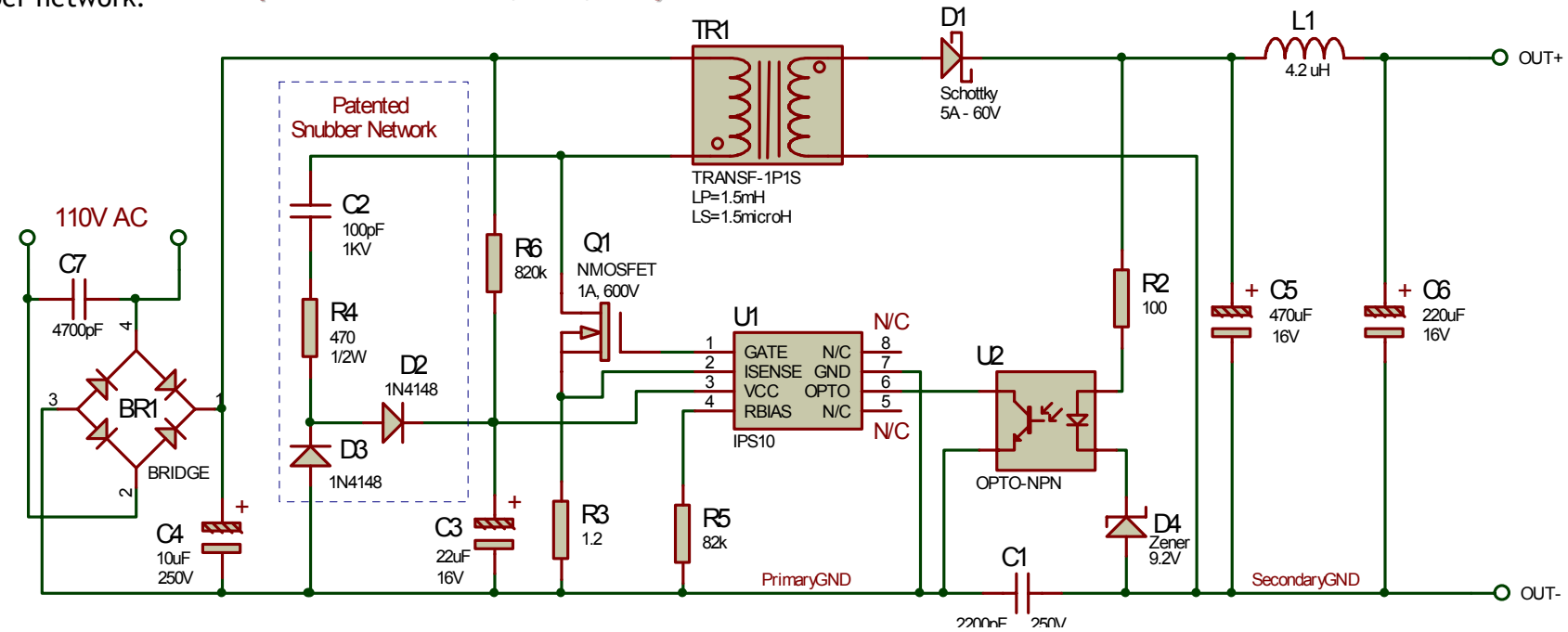


AAI patented modified snubber network.

- ***Traditional snubber type was redesigned and patented to:***
  - **Bypass existing patents to power the controller,**
  - **Allows SMPS Designs using standard MOSFETs,**
  - **Simplify the transformer,**
  - **Protect the MOSFET.**
- ***Royalty free Snubber for IN-PLUG® Customers***

(US Patent # 6,233,165)



IN-PLUG®: Independent MOSFET

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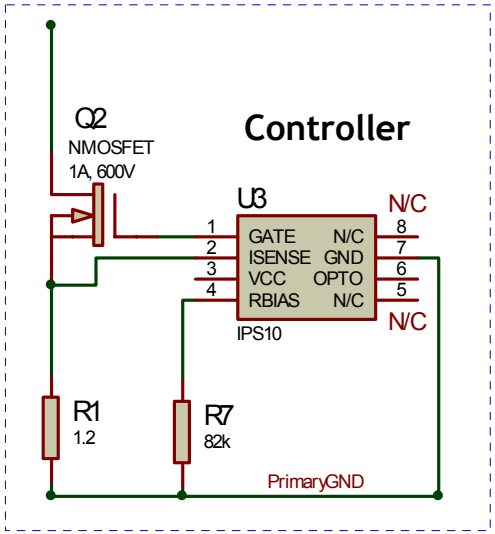
MOSFET

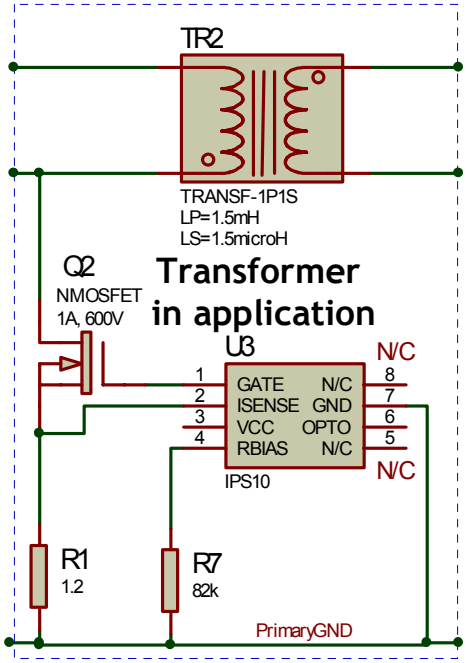


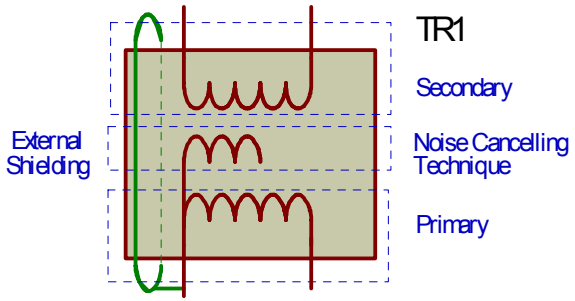
Independent MOSFET and Controller:

- Dual integration of controller and MOSFET on the same die is not a cost-effective solution.
- Independence brings full flexibility in selecting Standard Off-the Shelf MOSFETs:
  - Adequate power (with no influence on the controller cost)
  - Best rated
  - Lower cost one
  - Best for EMI
- Full Control of the gate to reduce EMI

IN-PLUG®: Noise Canceling Transformer

ASIC Advantage INC.





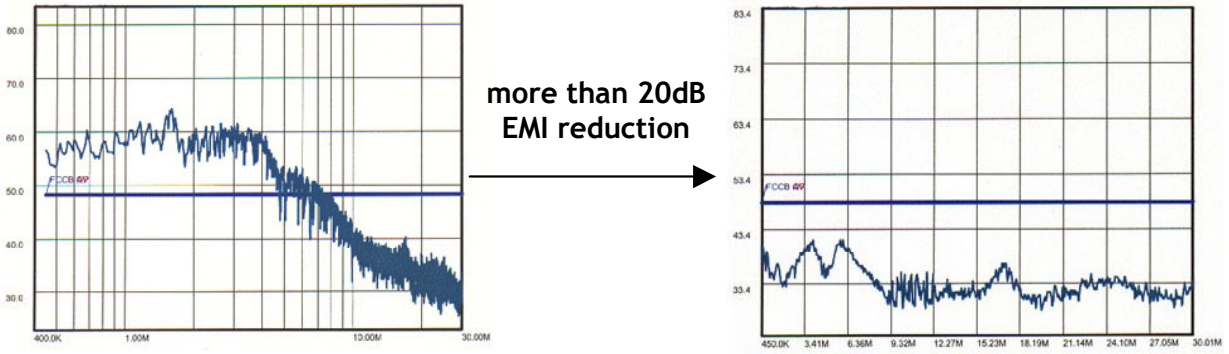
2-winding transformer built with noise-canceling techniques.

➢ *2-Winding Transformer:*

The controller is biased by the snubber network. No more need for a 3-winding transformer: Customers can buy off-the shelf transformers that are simpler to manufacture and lower cost.

➢ *Noise Canceling Techniques*

AAI provides transformer design guidance, to implement noise-canceling techniques and reduce EMI by more than 20dB.



Effect of Noise-Reduction Techniques on Transformer's Response to EMI

ASIC Advantage Inc. Tel: (1) 408-541-8686, Fax: (1) 408-541-8675

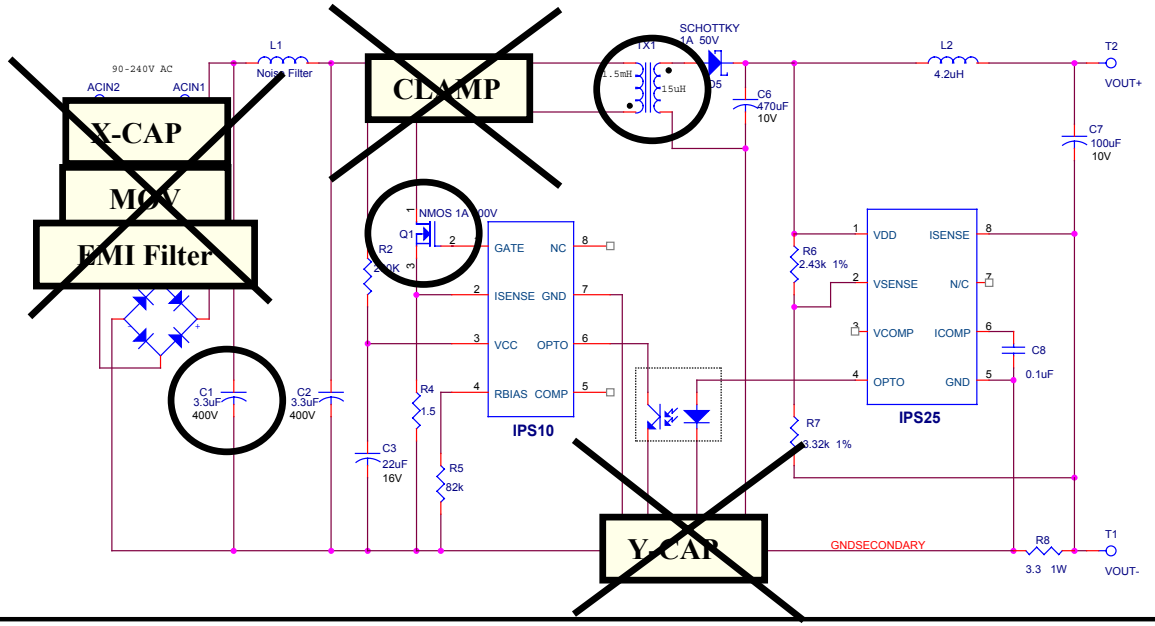
IN-PLUG®: Distributed Design Techniques

ASIC Advantage INC.

- AAI's design "distributed approach" combines EMI-reducing effects with exceptional efficiency in low-power SMPS applications solutions.

- Most conventional "brute force" costly components required for EMI-reduction are removed in low-power SMPSs:
  - * MOVs
  - * Dissipative Networks
  - * RF Inductors
  - * Clamps
  - * Ferrite Beads
  - * and other "brute force" solutions to reducing EMI.
  - * Large Capacitor Filters
  - * Feed-Through Capacitors

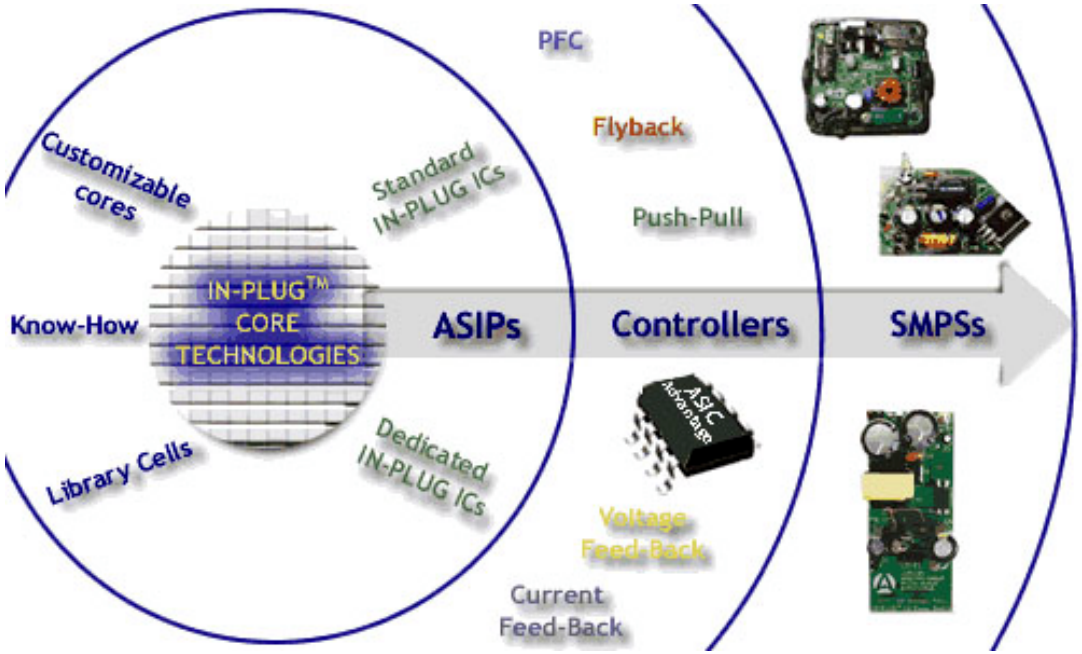
Cheapest way to comply with international EMI requirements



ASIPs= Application Specific IN-PLUG®s

ASIC Advantage INC.

- *AAI has developed SMPS "core libraries and techniques" (bricks)*
- *These bricks are included in a family of standard ASIPs and are also readily available for custom ASIPs.*



IN-PLUG® Technology

- **Means:**

System Level Solution:

- **Not:**

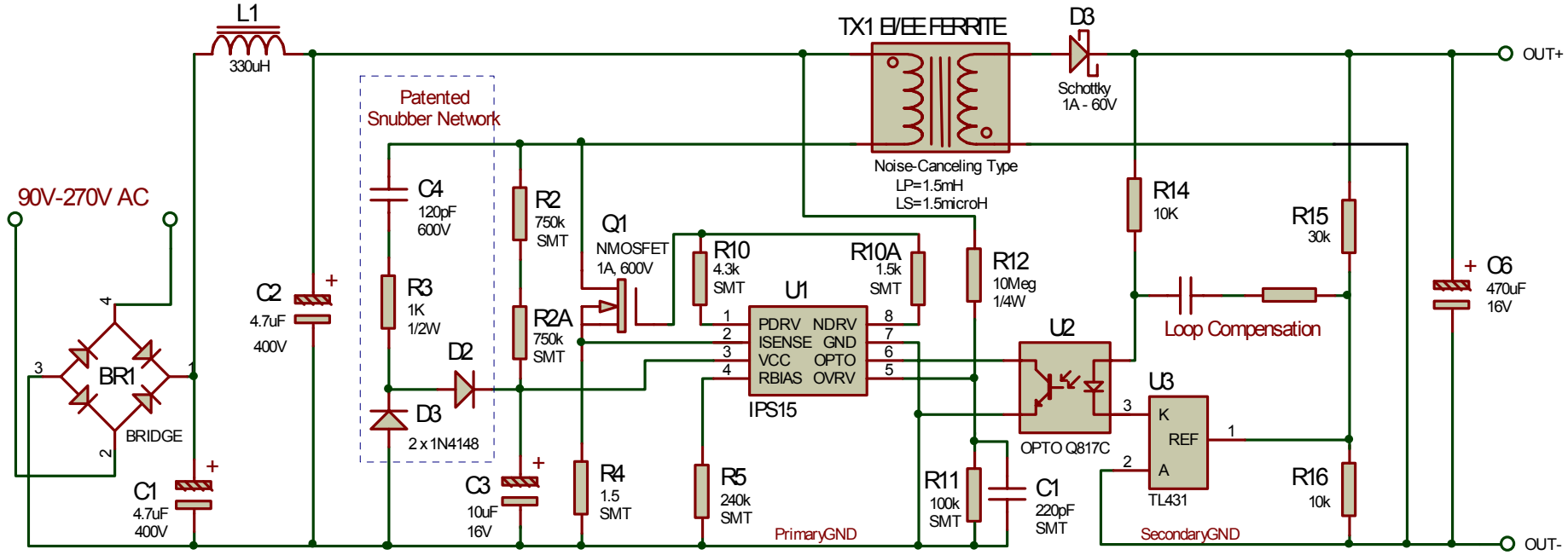
Just pin to pin replacement of existing chips!

IN-PLUG®: An Open Design Architecture

ASIC Advantage INC.

IN-PLUG® Technology is a "Common Design Platform"

- ***The Same Core Design Can be used for 12V/24V/48V/72V/110V/230V/400V Applications.***
- ***Only a Little Redesign Effort is Necessary Between Solutions***
  (Few PCB Components to Replace).



IN-PLUG®: Standard and Custom ASIPs

ASIC Advantage INC.

1 ➢ We are AAI's ASIP Controllers, we include SMPS core libraries. Our standard family covers market needs from 0.1W to 300W

2 ➢ We can also be 100% customized for specific requirements

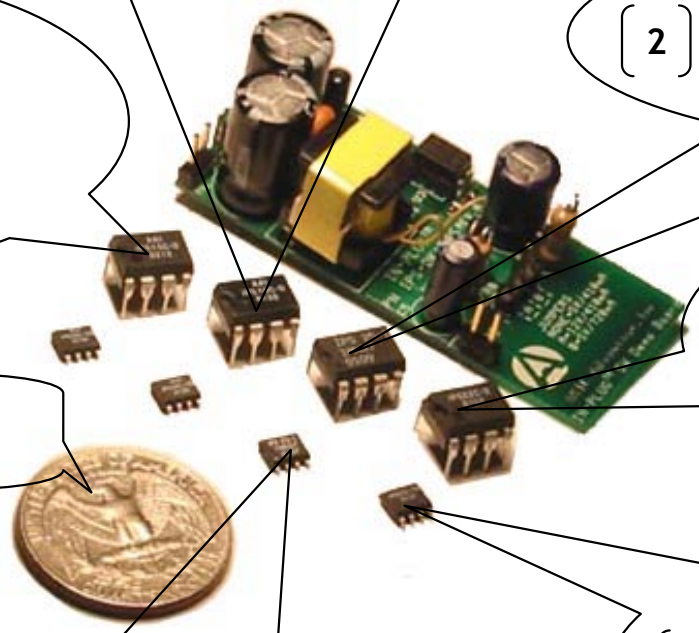
3 ➢ We can be optimized to drastically drive the cost down in high-volume applications

4 ➢ We include what the other vendors propose and what they would like to...

5 ➢ No other vendors offer a customization service

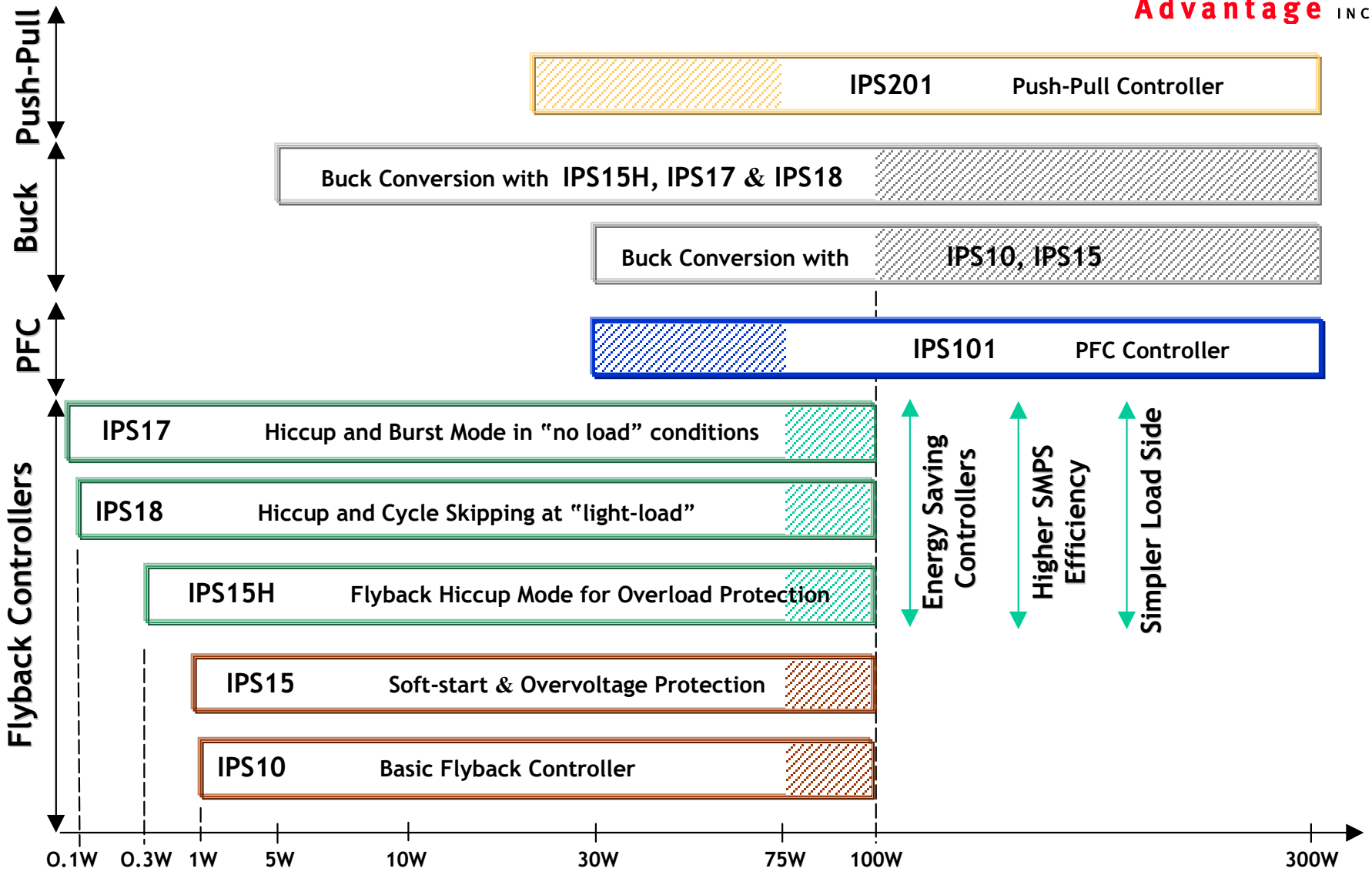
6 ➢ We also control:
- System Cost
- System Size
- System Energy

"SMALL CHIPS, BIG SAVINGS"
I love the IN-PLUG® concept!



IN-PLUG®: Standard ASIPs

ASIC Advantage INC.



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IN-PLUG® : ASIP Product Overview

ASIC Advantage INC.

Flyback Controllers

Output Current is Controlled from the Primary

IPS10	IPS15	IPS15H	IPS18	IPS17
Basic Flyback Controller. • Adjustable Osc. • PWM • Current Sensing • Thermal Shut-down	IPS10 Controller + Soft-start + Overvoltage Protection	IPS15 Controller + Hiccup Overload Protection	IPS15H Controller + very low quiescient current + Skipping cycles at "light-load"	IPS15H Controller + Burst mode at "no-load"

Pin to Pin Compatible

Feedback Controllers

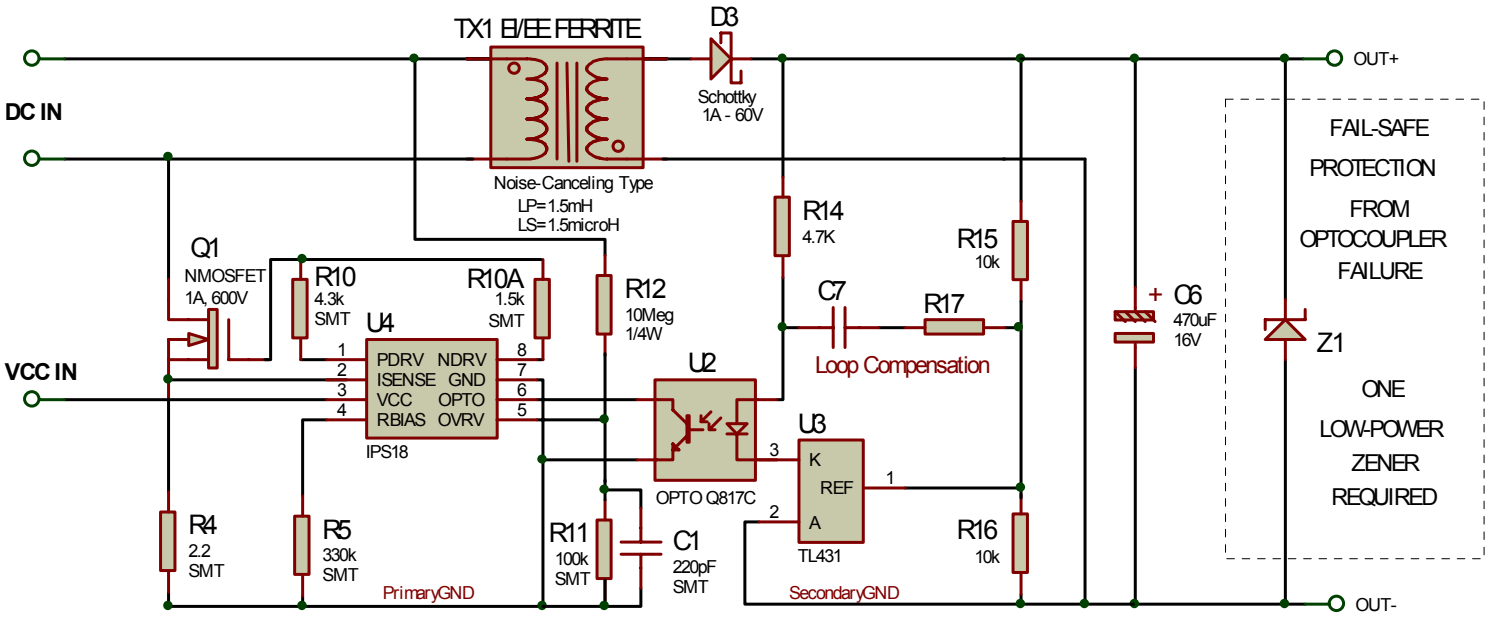
Perform voltage regulation and current limiting or current regulation and voltage limiting

IPS25	IPS22	IPS23
Feedback Controller. • Precision 2.6V Voltage Reference. • Precision 1.3V for currentregulation/limiting • Error Voltage Amp. With Loop Compensation • Current Output to Optocoupler for Noise Rejection • Powered by SMPS Output or an Auxilliary Supply	Feedback Controllers. • Precision 2.6V Voltage Reference. • Precision 250mV for current regulation/limiting • Error Voltage Amp. With Loop Compensation • Powered by SMPS Output or an Auxilliary Supply • IPS23 includes a protection zener	

Iout = 800mA

ASIC Advantage INC.

PROTECTION AGAINST OPTOCOUPLER FAILURE USING A SIMPLE LOW-COST, LOW-POWER ZENER



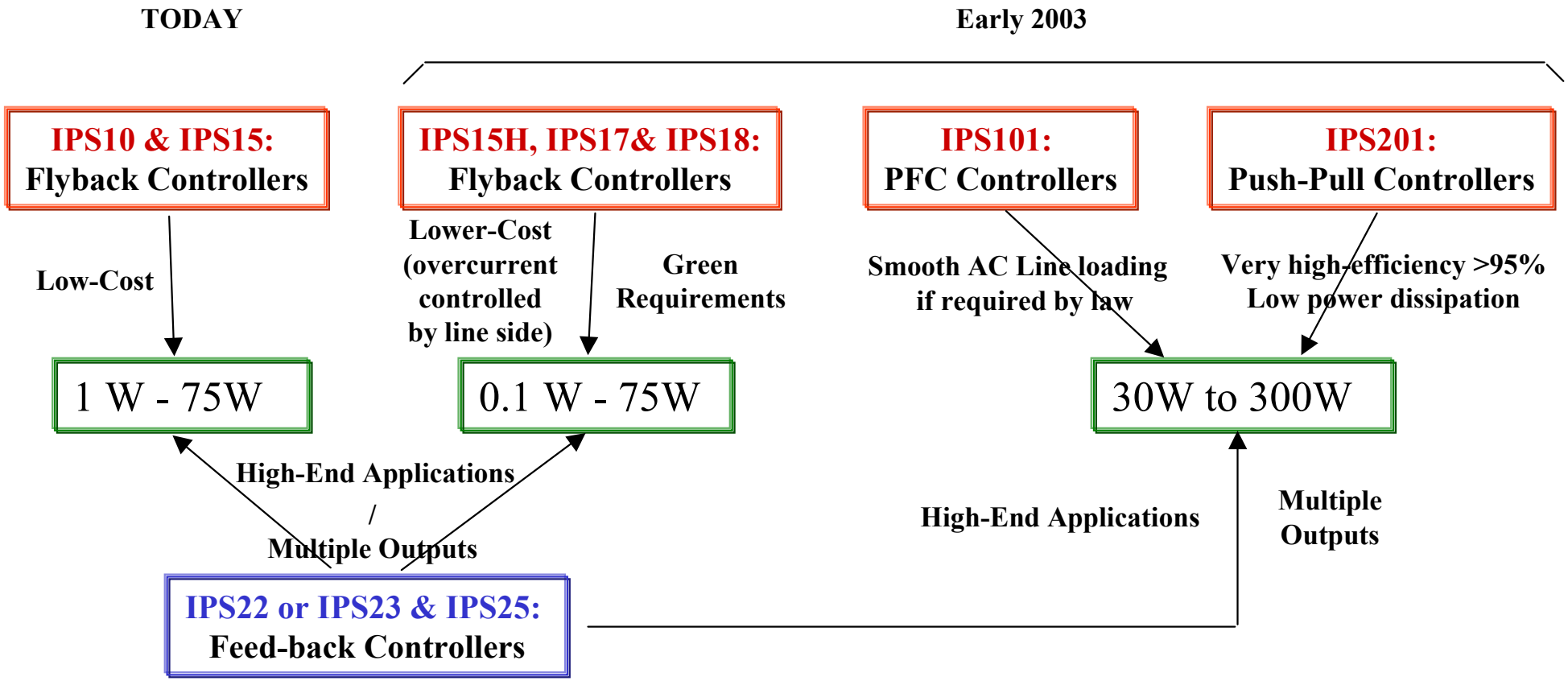
HICCUP CAPABILITY + LOW-COST OUTPUT ZENER DIODE

=

VERY AFFORDABLE PROTECTION AGAINST OPTOCOUPLER FAILURE

IN-PLUG®: Application Targets?

ASIC Advantage INC.



IN-PLUG®: Power Input/Output Basics

ASIC Advantage INC.

AC Input Types

USA	Japan	Europe	International
120V, 60Hz	100V, 50Hz	220V, 50Hz	85V - 270V 50-60Hz

Applications vs Power Range

Palms	Cell Phones	Cordless	Cameras	Power Tools	Laptops
5W	5-10W	3-5W	3-10W	20-75W	20-60W
Desktops	LCD Monitors	Printers	Games	TVs	VCRs/DVDs
100-300W	30-50W	30-75W	3-10W	75-150W*	75-150W*
				* 0.3W - 1W in standby	

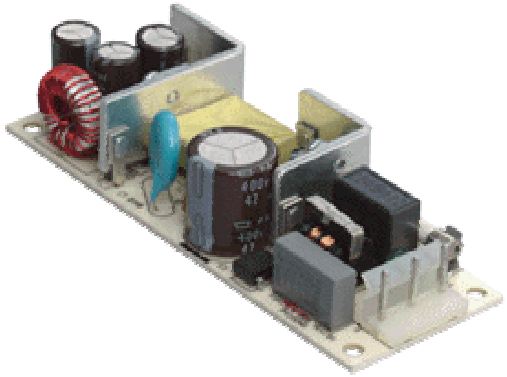
IN-PLUG®: SMPS Examples

ASIC Advantage INC.

SMPS Means: "Switch-Mode Power Supply"
It transforms AC voltage into DC voltage.

5W Plug Charger for Digital Cameras and MPEG Players

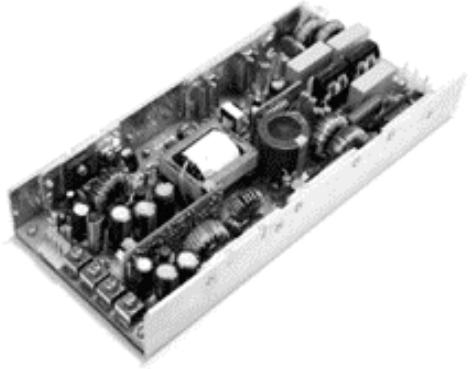
Universal 5W AC/DC Adaptor for PDA and Modems



15W board for compact equipment

60W SMPS for notebooks or portable equipment

130W SMPS for industrial, gaming, telecom, networking applications and portable equipment



200W board for networking, industrial equipment

IN-PLUG®: Typical Applications

ASIC Advantage INC.

Desktops

Laptops

PDAs

TVs, VCRs, DVDs

SMPSs are involved in many consumer products :

- **Cellphones, PDAs, Digital & VTR Cameras, Computer Peripherals, Laptops, LCD Displays, Power Tools.**
- **Standby for Computers, Audio/Video Equipment, TVs, DVDs, VCRs, LCD Monitor. Printers …**

Cameras

Cell and portable phones

Printers

Games

Power Tools

IN-PLUG®: Product Availability / Status

ASIC Advantage INC.

Line Side	Rev	Datasheet	Status	Available for sampling
PFC Controller: IPS101	2	yes	fab	Mid-April 2003
Flyback Controllers: IPS10, IPS15	7, 3	yes	stock	Now
Flyback Controllers: IPS15H,18	3	yes	fab.	Now
Push-Pull Controller: IPS201	1	advanced	engineer.	Mid-2003
Load side				
Feed-Back Controller: IPS22	3	yes	stock	Now
Feed-Back Controller: IPS25	3	yes	stock	Now

ASIPs CAN ALSO BE CUSTOMIZED UPON SPECIFICATION!

IN-PLUG®: Documentation Access

ASIC Advantage INC.

Visit http://www.in-plug.com

- Application Note --> http://www.in-plug.com/applinotes/AN-IPS-01_rev2.pdf

"How to build cost-effective off-line Low-Power Flyback SMPS with AAI's IN-PLUG® series controllers"

- Application Note --> http://www.in-plug.com/applinotes/AN-IPS-02_rev1.pdf

"Reducing SMPS EMI and make every component and every cent count"

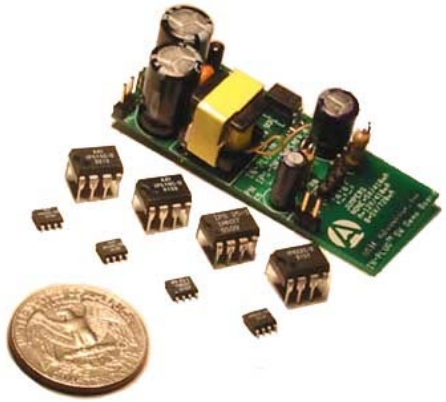
- IPS10 datasheet --> http://www.in-plug.com/datasheets/IPS10_rev7.pdf
- IPS15 datasheet --> http://www.in-plug.com/datasheets/IPS15_rev3.pdf
- IPS25 datasheet --> http://www.in-plug.com/datasheets/IPS25_rev2.pdf
- IPS22/23 datasheet --> http://www.in-plug.com/datasheets/IPS22_rev3.pdf
- IPS201 advanced information --> http://www.in-plug.com/datasheets/IPS201_advanced_information

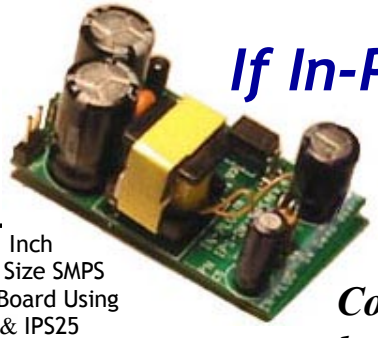
IN-PLUG®: DK-IPS1525 Evaluation Kit Box

ASIC Advantage INC.

Includes:

- IPS-DK1525 REVB Demo-board with individual test results
- IPS-DK1525 guide book
- IPS15 / IPS25 datasheets
- IPS15 / IPS25 DIP samples (10 each)
- IN-PLUG® product presentation





1.6 X 1 Inch
Actual Size SMPS
Demo Board Using
IPS15 & IPS25

If In-Plug® Controllers Can't Save 30%...

Cost It Out for Yourself!

ASIC Advantage INC.

Compare costs to build an SMPS using In-Plug® against what otherwise would be paid if you were to achieve same size and performance using current methods.

Electrical Characteristics of Above *In-Plug®* Low-Power Demo Board	**Value**	**Units**
Input Voltage	85 - 265	VAC
Input Frequency	47 - 63	Hz
Output Voltage Range	5 or 12	VDC
Low Line In-Rush Current @ 115V	8	A typ
High Line In-Rush Current @ 230V	12	A typ
Line Regulation (No-Load)	< 0.5	% max
Line Regulation (Full-Load)	< 0.5	% max
Load Regulation (Any Input Voltage)	< 2	% max
Current Regulation @ 5V	720	mA typ
Current Regulation @ 12V	410	mA typ
Efficiency @ 12V (With Current Regulation)	68	%
Over-voltage Protection	270	VAC
Transient Response	< 2	mS max
Ripple and Noise (Peak to Peak), 5V 700mA, Vin-85VAC	< 200	mV
Ripple and Noise (Peak to Peak), Full-Load, Vin-230VAC	< 200	mV
Start-Up Time	2	S max
Safety Ground Leakage Current, Full-Load, Vin-230VAD	< 50	uA

Qty	Component	Cost
Line Side		
1	Rectifier Bridge	_____
2	400V Aluminum Caps	_____
1	16V Aluminum Caps	_____
1	600V Ceramic Caps	_____
5	Resistors	_____
2	1N4148 Diodes	_____
1	1A, 600V MOSFET	_____
1	*In-Plug® Flyback Controller*	$0.21 (100K pcs)
Load Side		
1	1A, 60V Schottky Diode	_____
2	16V Aluminum Caps	_____
3	Ceramic Caps	_____
5	Resistors	_____
1	*In-Plug® Feedback Controller*	$0.17 (100K pcs)
Common		
1	13mm 2-Winding Transformer	_____
1	Opto Couplers	_____
1	PCB (1.6 x 1 in - 40mm x25mm)	_____
Unnecessary Components		
	~~*Transformer 3rd Winding*~~	~~*$0.00*~~
	~~*EMI Filter*~~	~~*$0.00*~~
	~~*X-Cap; Y-Cap*~~	~~*$0.00*~~
	~~*MOV*~~	~~*$0.00*~~
	Total	

... On Your SMPS, We'll Understand If You Don't Call!