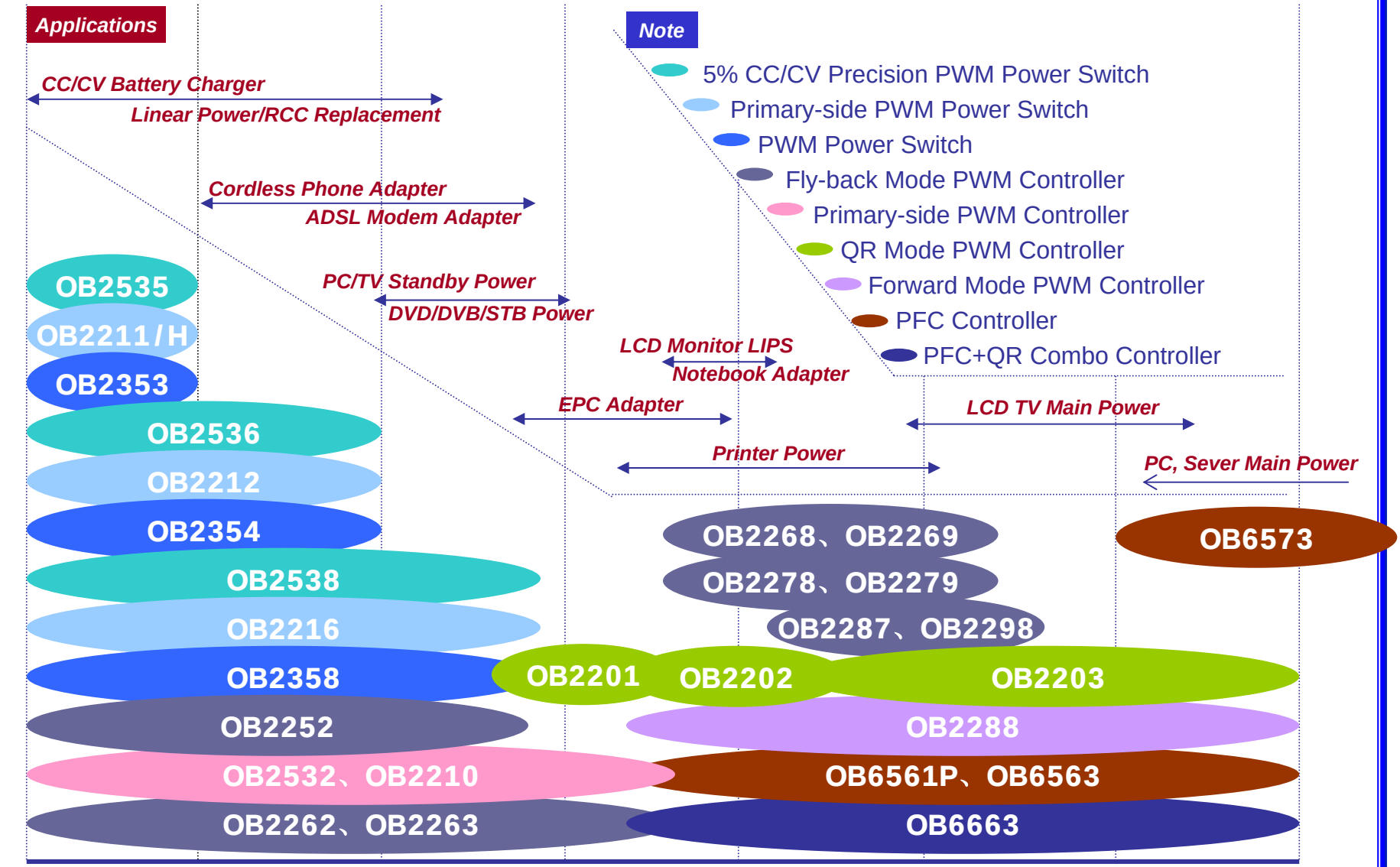
On-Bright AC-DC Product Overview

On-Bright AC/DC Product Profile & EE Applications

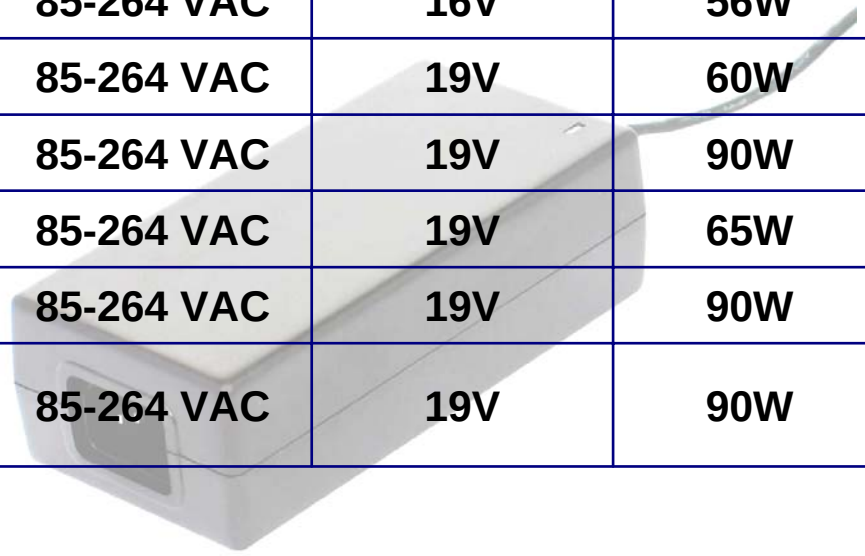


On-Bright AC/DC Products Application Lineup

------Adapter

➢ ***Reference Designs***

IC Series	*IC P/N*	*Input Voltage*	*Output Voltage*	*Output Power*
PWM Controller	OB2262/3	85-264 VAC	12V	12W
	OB2268/9/9U	85-264 VAC	16V	56W
	OB2278/9	85-264 VAC	19V	60W
	OB2298	85-264 VAC	19V	90W
Pure QR	OB2202	85-264 VAC	19V	65W
QR+PFC	OB2203+OB6563	85-264 VAC	19V	90W
QR+PFC Combo	OB6663	85-264 VAC	19V	90W



On-Bright AC/DC Products Application Lineup

------Charger

➢ *Reference Designs*

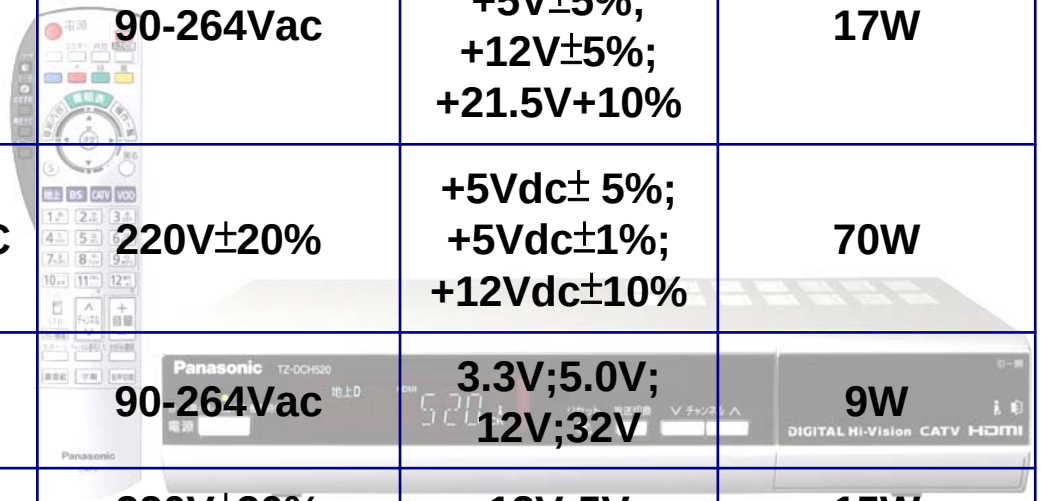
IC Series	IC P/N	Input Voltage	Output Voltage	Output Power
Power Switch	OB2353	85-264 VAC	5V	5W
	OB2353	85-264 VAC	6V	5.4W
	OB2354	85-264 VAC	5V	7.5W
	OB2358	85-264 VAC	12V	12W
Primary Side Power Switch	OB2211	85-264 VAC	7V	3.5W
	OB2211	85-264 VAC	9V	4.5W
	OB2211H	85-264 VAC	9V	4.5W
	OB2211H	85-264 VAC	5V	5W
	OB2211Q	85-264 VAC	5V	5W
	OB2211V	85-264 VAC	5V	5W
	OB2212	85-264 VAC	9V	9W
	OB2212Q	85-264 VAC	9V	9W
	OB2216	85-264 VAC	12V	12W
High Precise Primary Side Power Switch	OB2535	85-264 VAC	5V	5W
	OB2535	85-264 VAC	9V	4.5W
	OB2535	85-264 VAC	5W	3.5W

On-Bright AC/DC Products Application Lineup

------- STB/DVB-C-T-S Power

➢ *Reference Designs*

IC Series	IC P/N	Input Voltage	Output Voltage	Output Power
PWM Controller	OB2263	90-264Vac	+3.3V±5%; +5V±5%; +12V±5%; +21.5V+10%	17W
	OB2269C	220V±20%	+5Vdc± 5%; +5Vdc±1%; +12Vdc±10%	70W
Power Switch	OB2354	90-264Vac	3.3V;5.0V; 12V;32V	9W
	OB2358	220V±20%	12V;5V	15W
	OB2358	90-264Vac	5V;12V;-15V; -18V; -28V	15W

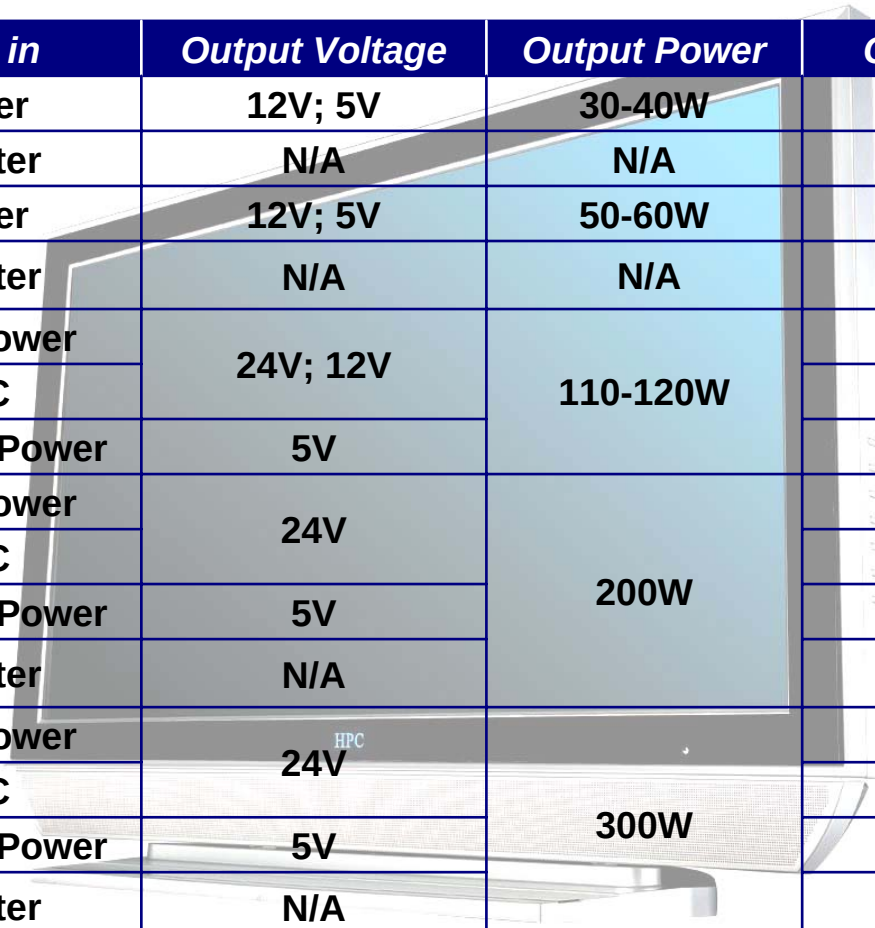


On-Bright AC/DC Products Application Lineup

------LCD TV Power

➢ *Reference Designs*

Solution	IC P/N	Used in	Output Voltage	Output Power	CCFL
17-19' LIPS	OB2263	Power	12V; 5V	30-40W	N/A
	OB3316/8	Inverter	N/A	N/A	4L
22' LIPS	OB2269C	Power	12V; 5V	50-60W	N/A
	OB3316	Inverter	N/A	N/A	4L
26’ LCD TV Power	OB2202	Main Power	24V; 12V	110-120W	N/A
	OB6563	PFC			N/A
	OB2358	Standby Power	5V		N/A
32’ LCD TV LIPS	OB2202	Main Power	24V	200W	N/A
	OB6563	PFC			N/A
	OB2358	Standby Power	5V		N/A
	OB3316	Inverter	N/A		6U
47’ LCD TV LIPS	OB2202	Main Power	24V	300W	N/A
	OB6563	PFC			N/A
	OB2358	Standby Power	5V		N/A
	OB3316	Inverter	N/A		24L

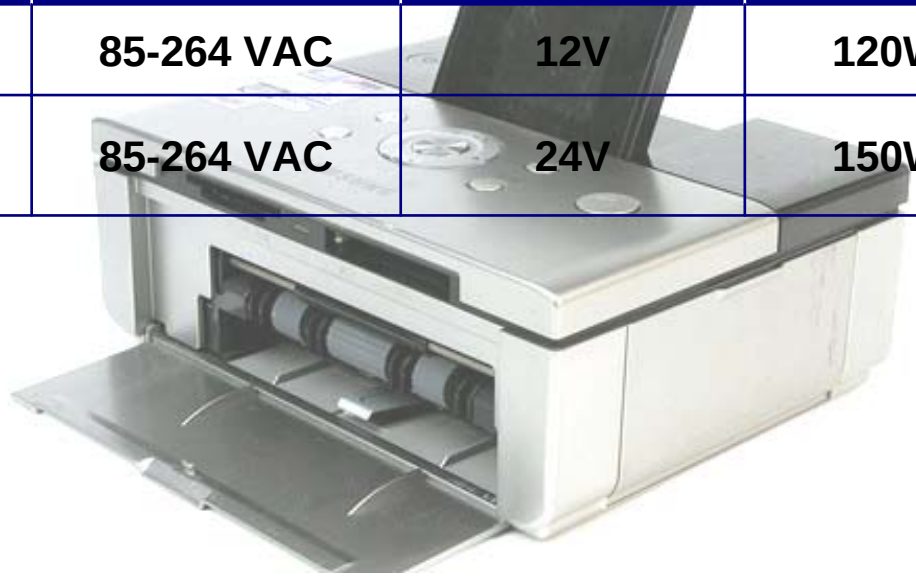


On-Bright AC/DC Products Application Lineup

------Printer Power

- ***Reference Designs***

IC Series	*IC P/N*	*Input Voltage*	*Output Voltage*	*Output Power*
PWM Controller	OB2287	85-264 VAC	12V	120W
	OB2287	85-264 VAC	24V	150W



On-Bright AC/DC Products Application Lineup

------ Home Appliance Power

- ***Reference Designs***

Application	*IC P/N*	*Input Voltage*	*Output Voltage*	*Output Power*
电磁炉	**OB2212**	**85-277 VAC**	**5V; 18V**	**6W**
咖啡炉	**OB2212**	**90-264 VAC**	**5V; 24V**	**0.6W**
饮水机	**OB2212**	**90-264 VAC**	**12V**	**6W**

On-Bright Product One-By-One Overview

On-Bright Power Switch Selection Guide

- **On-Bright Linear Replacement Solution Selection Guidelines:**

  1. 0 – 4.5W: OB2211 --- system cost effective; OB2211H --- Enhanced CC performance
  2. 4.5W – 5W: OB2211H
  3. 5W – 9W: OB2212
  4. 9W-12W: OB2216

- **On-Bright Charger Solution Selection Guidelines:**

  1. 0 – 5W: OB2535
  2. 5W – 9W: OB2536
  3. 9W – 12W: OB2538

- **On-Bright Adaptor Solution Selection Guidelines:**

  1. 0 – 5W: OB2353
  2. 5W – 9W: OB2354
  3. 9W – 12W: OB2358

- **On-Bright Open Frame Adapter Solution Selection Guidelines:**

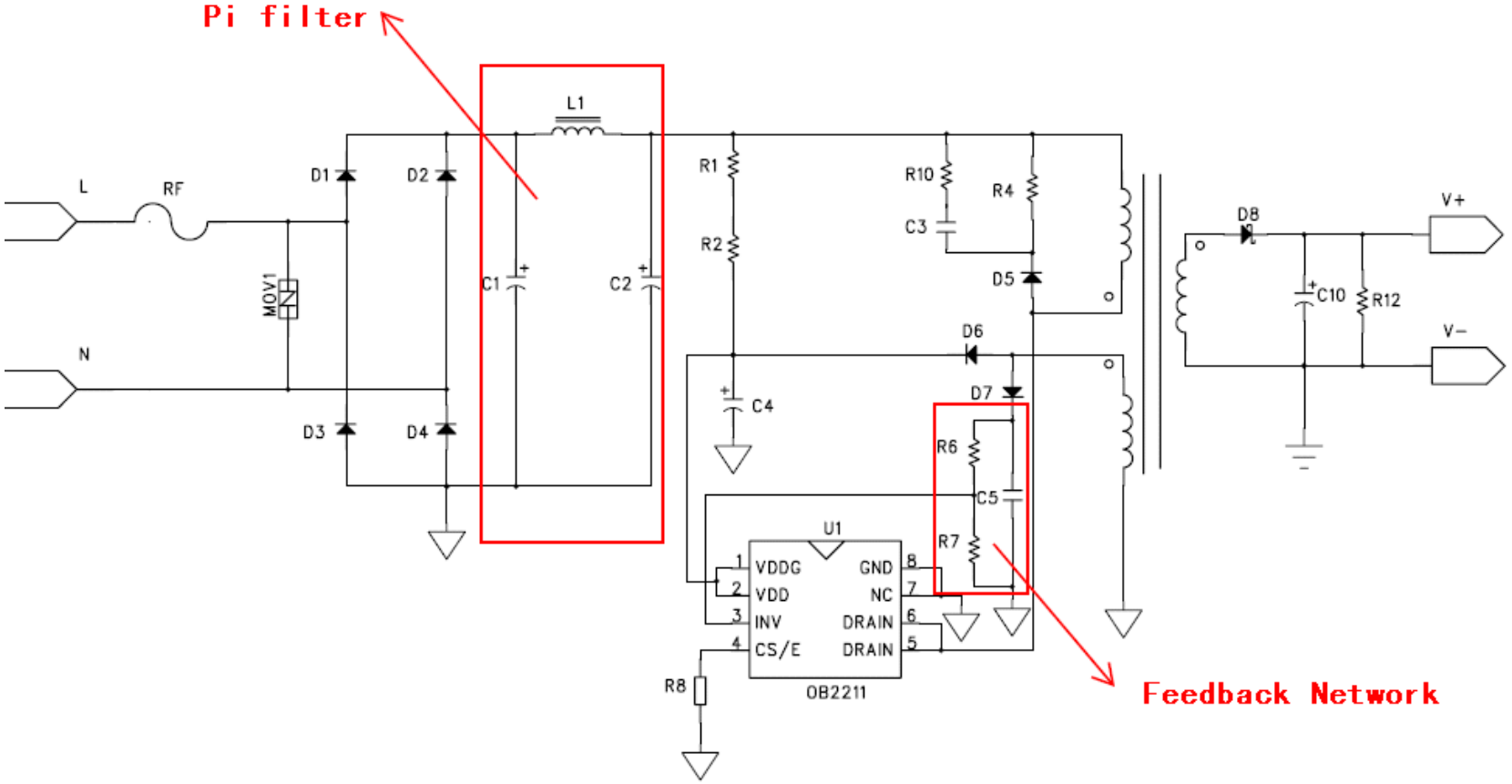
  1. 12W – 15W: OB2358 --- Full AC Line Voltage: 85V – 264V
  2. 15W – 26W: OB2358 --- Single 230V AC line

OB2211/11H/12/16 Series

- Power Switch (PWM+MOSFET)
- Cost and Performance Trade Off
  - Primary Side Sensing Eliminates TL431 and Opto-Coupler
- GreenEngine Technology

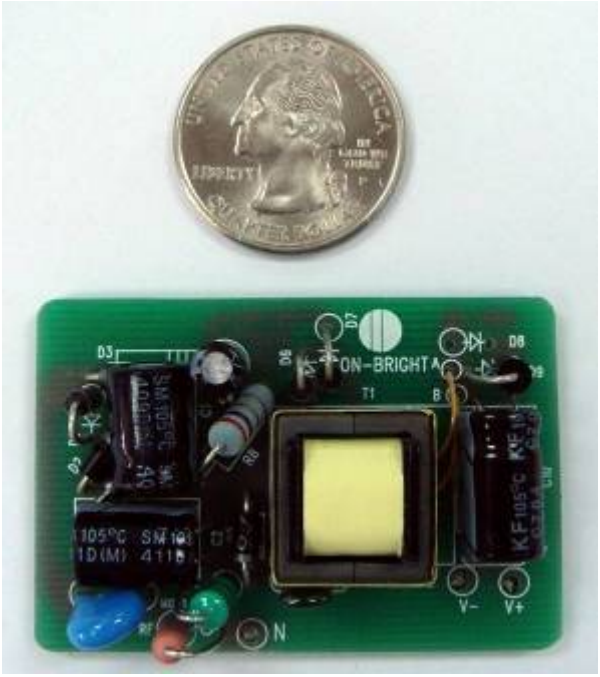
  → Low standby, High Efficiency, EMI, etc.
- Dedicated for Linear Power Replacement—EMI Focus
- Programmable Constant Voltage and Constant Current
- Short Circuit Protection and Auto-Recovery

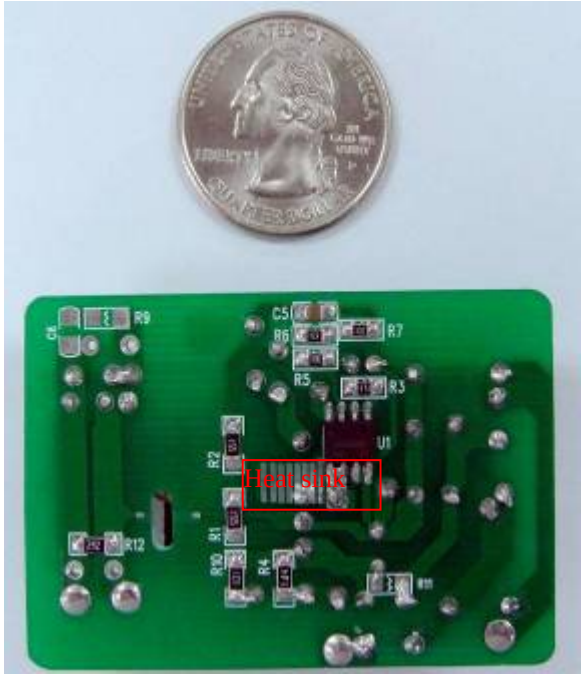
OB221X Series For Linear Replacement



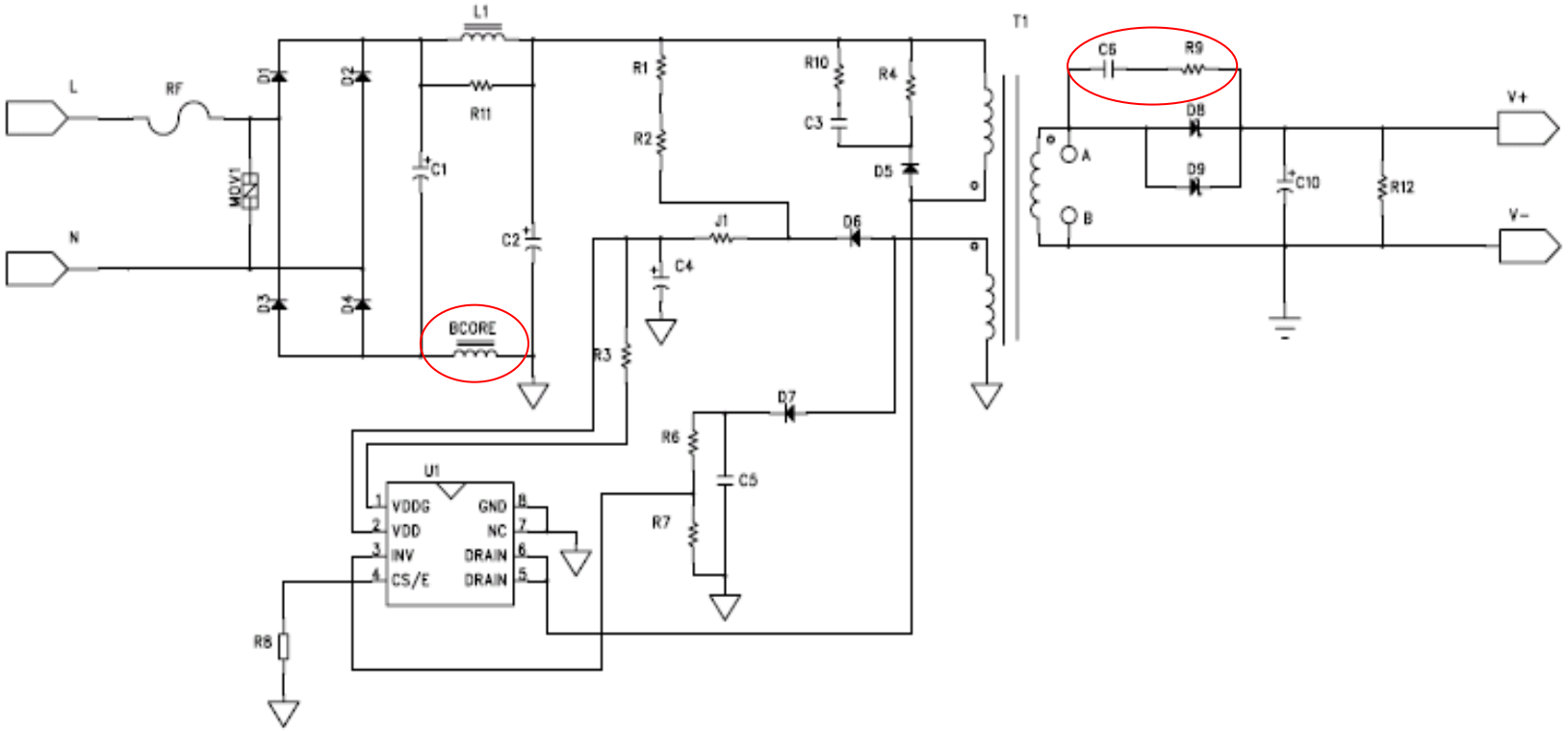
No-X, No-Y, No-Common Choke and No Bead Core are Used!

OB2211 2.5W/3.5W/4.5W Series For Linear Replacement



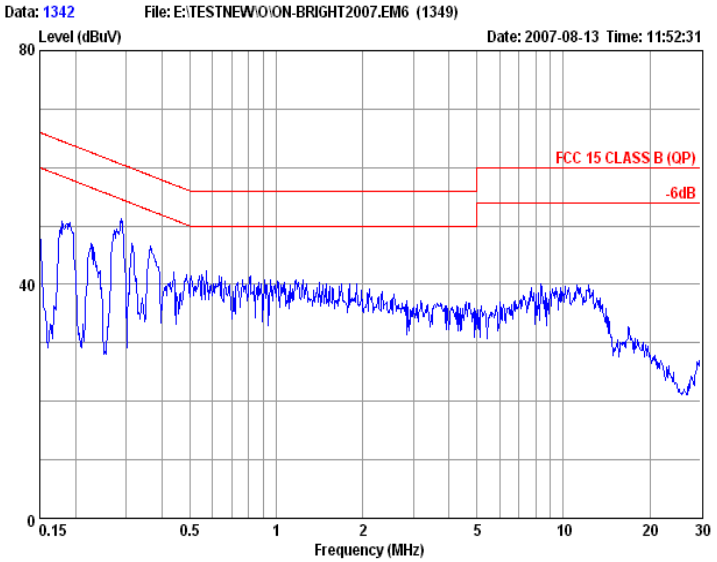


4.5W (9V/500mA) With OB2211H

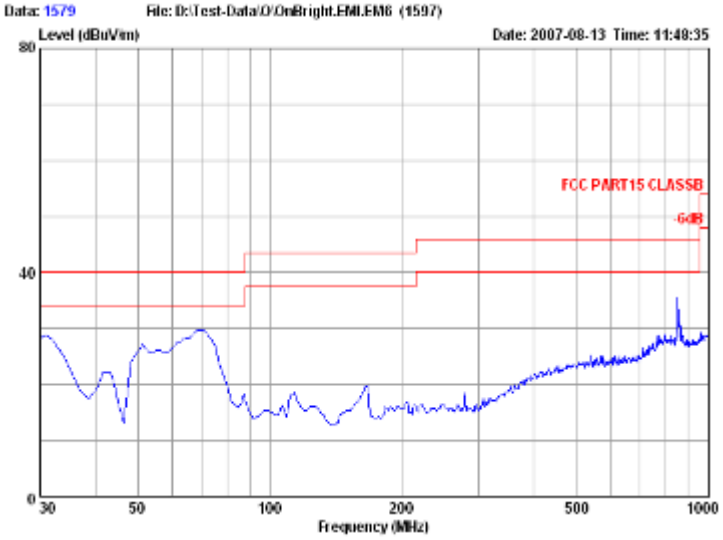


4.5W (9V/500mA) With OB2211H

➢ EMI



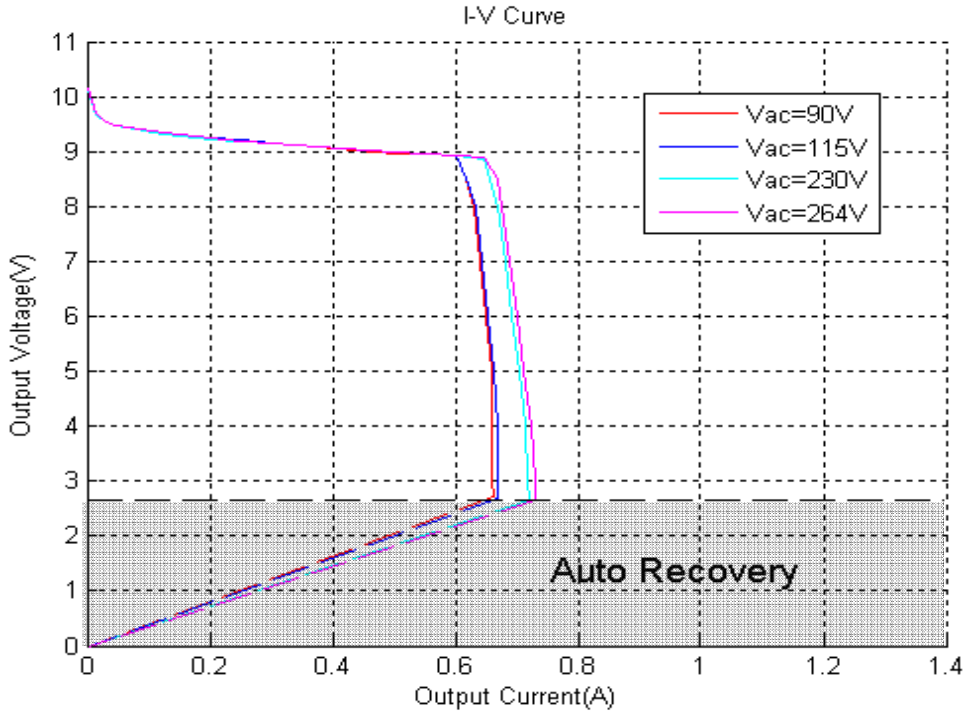
Site	: Audix ACI(Conducted Emission)
Condition	: FCC 15 CLASS B (QP) KNW407-4-07.04.06 VA
Project No.	:
Applicant	:
EUT	: POWER SUPPLY
M/N	: OB2211
S/N	: 4.5W 9V 0.5A
Power Supply	: 120V/60Hz
Ambient	: 25'C 55%RH
Test line	: VA
Test Mode	: FULL LOAD
Test Engineer	: Raven
Memo	:
Memo	:



Site	: Chamber 3
Condition	: FCC PART15 CLASSB 3m VERTICAL
Project No.	:
Applicant	: On Bright
EUT	: POWER
M/N	: OB2211
S/N	:
Power Supply	: 120V/60Hz
Ambient	: 22'C 60%RH
Test Mode	: FULL LOAD
Test Engineer	: Leo
Memo	: 9V 0.5A

4.5W (9V/500mA) With OB2211H

I-V Curve



Performance Comparison Matrix

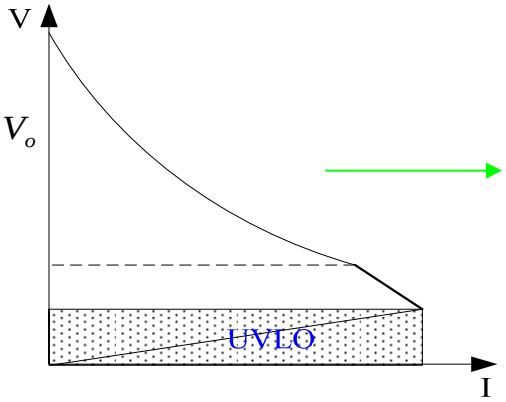
Feature	OB2211	OB2211H	OB2212	LNK562	LNK563	LNK564
Package	Sop-8	Sop-8	Dip-8	DIP8B/SMD8B	DIP8B/SMD8B	DIP8B/SMD8B
Max output power (W) *	4.5	5.5	9	1.9	2.5	3
Adjusting Output Power	Y	Y	Y	N	N	N
Programmable CC	Y	Y	Y	N	N	N
Adjustable Gate Driver	Y	Y	Y	N	N	N
Soft Start	Y	Y	Y	N	N	N
Frequency Jittering	Y	Y	Y	Y	Y	Y
Frequency at Auto-Recovery	24%F_{OSC}	24%F_{OSC}	24%F_{OSC}	48%Fosc (Fosc=66kHz)	48%Fosc (Fosc=83kHz)	48%Fosc (Fosc=100kHz)

*: Enclosed. The Max Power is Higher For Open Frame

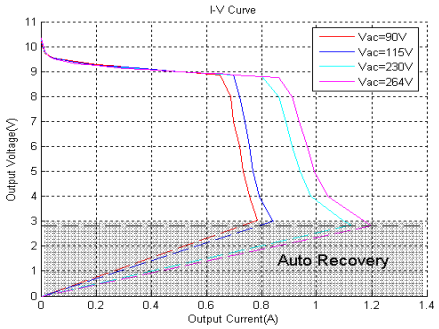
High Precision CC/CV Primary-Side PWM Power Switch

High Precision Primary-Side Technology

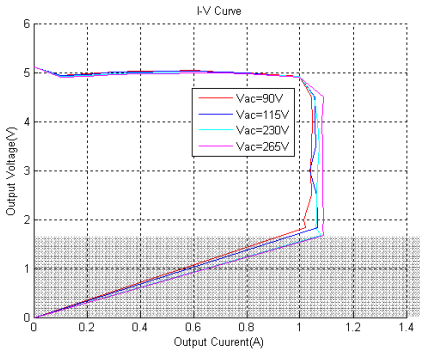
Development Of Primary-Side Technology



Linear



Pri-Side Linear replacement



Pri-Side accurate CV/CC regulation

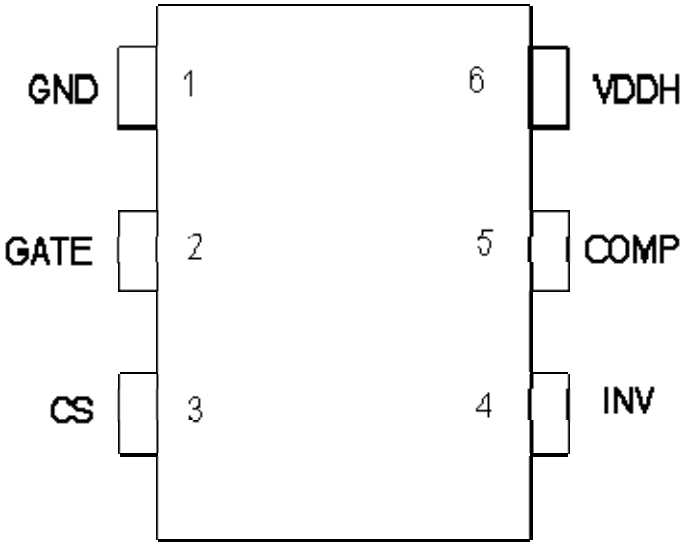
High Precision Primary-Side Technology

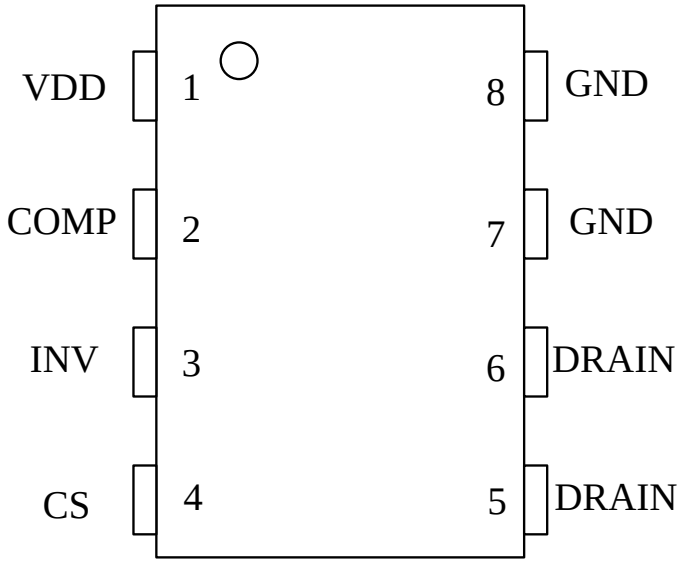
Advantage Of Primary-Side Technology

- Primary-side Sensing and Regulation Without TL431 and Opto-coupler
- High precision CV/CC regulation(CV:5% &CC:10%)
- Meet EPS2.0 Level 5 and Pass EN55022 EMC requirement

High Precision Primary-Side Controller & MCM

Pin Configuration



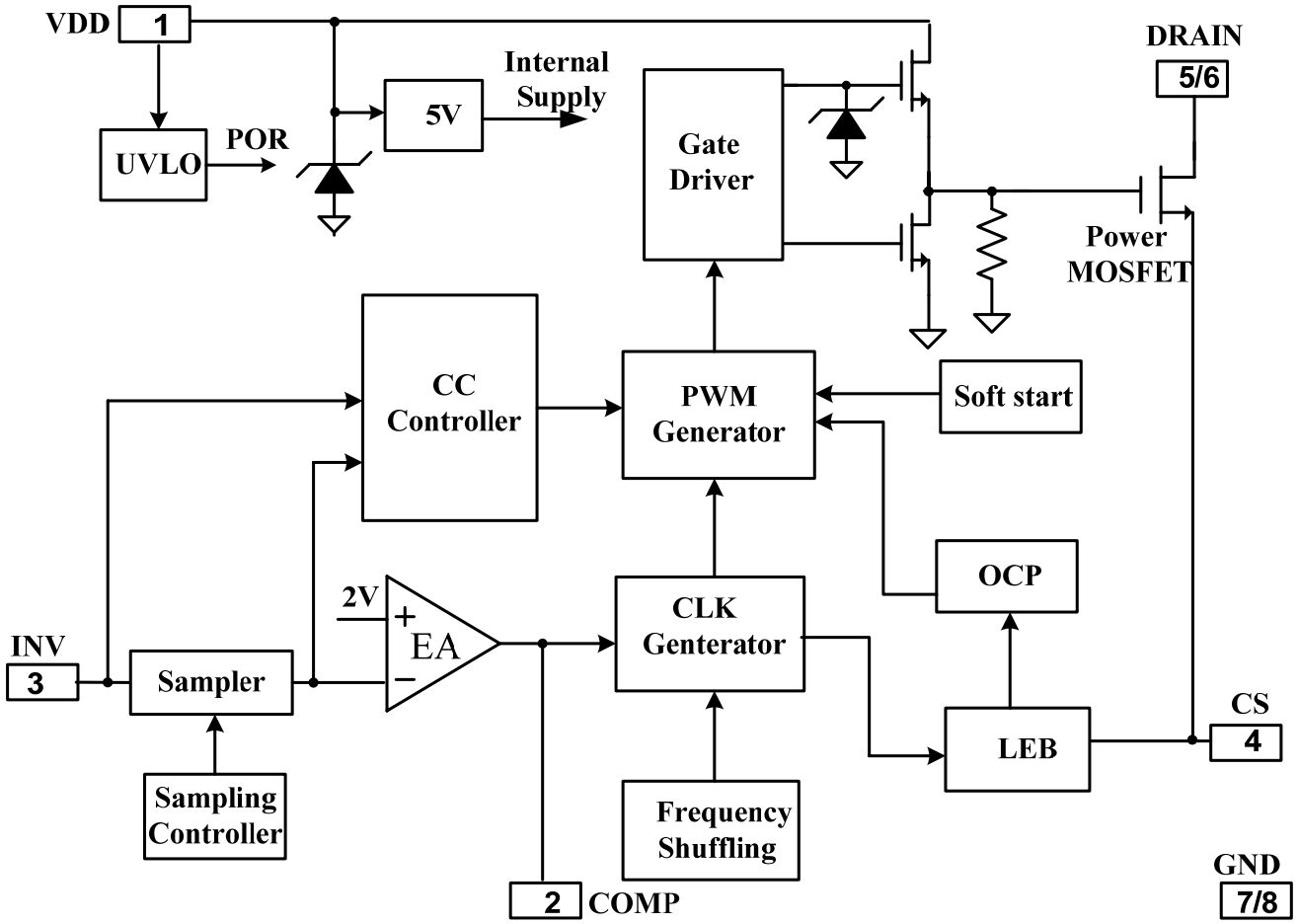


Controller OB2532

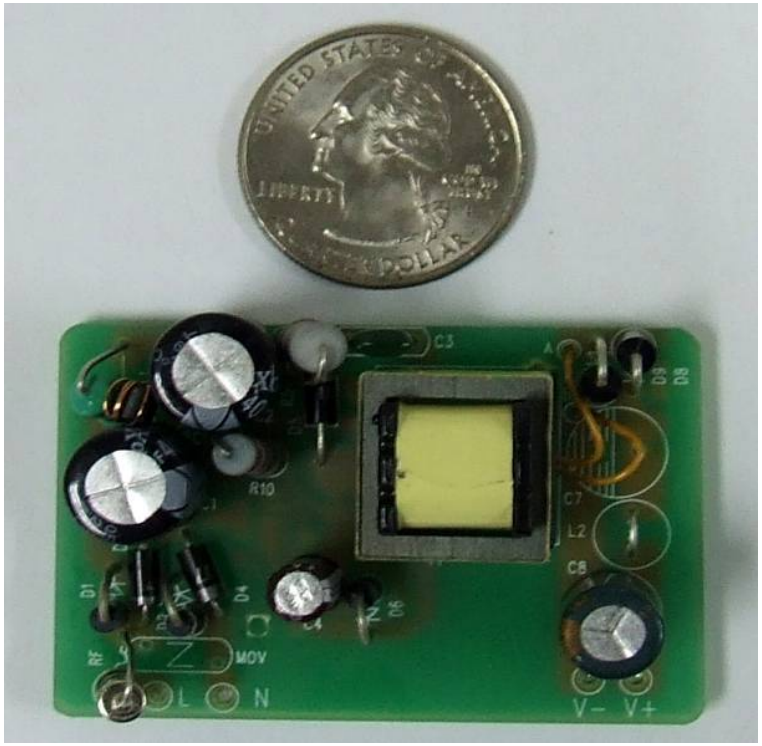
MCM: SOT OB2535
DIP OB2536/8

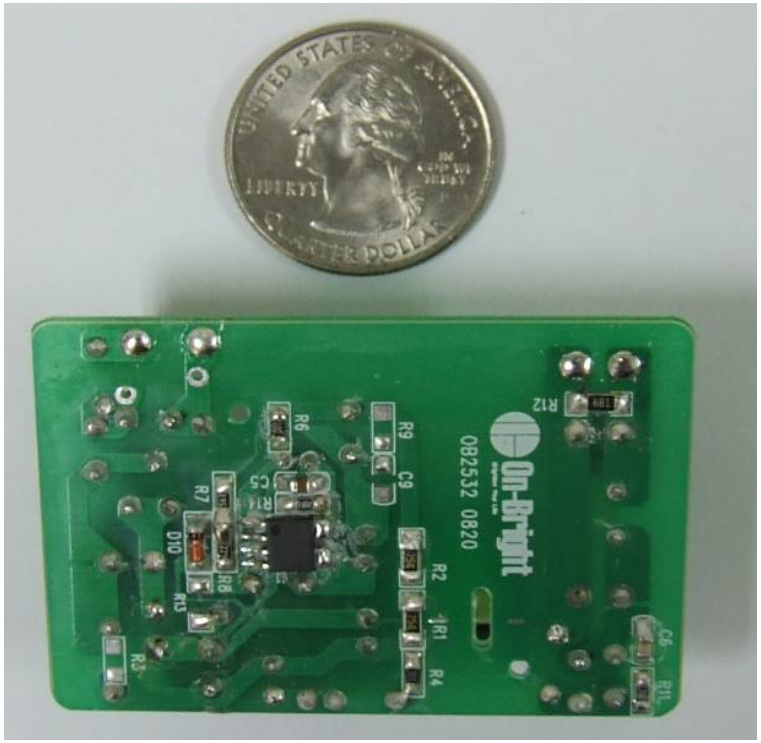
High Precision Primary-Side Controller & MCM

OB2535 Block Diagram



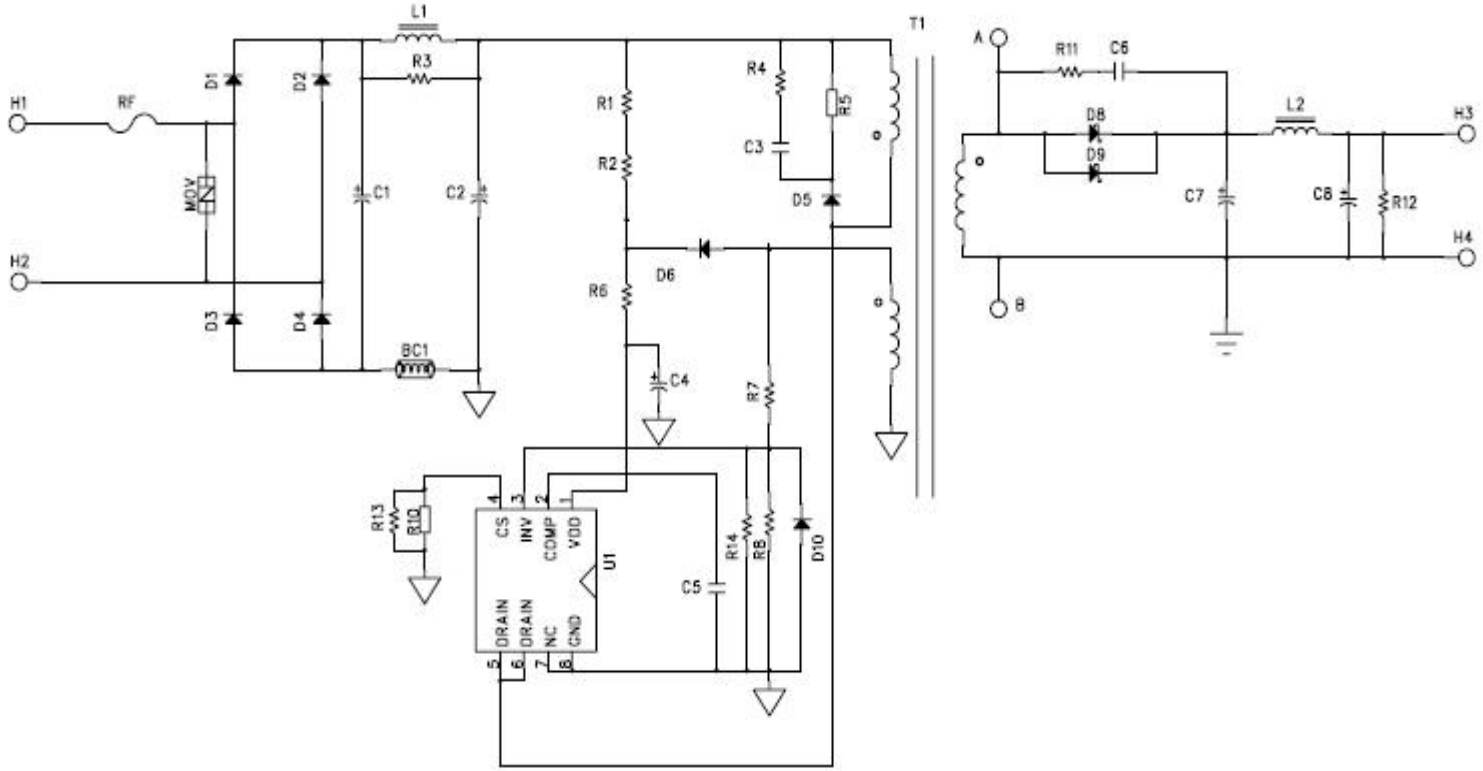
5W(5V/1A) Demo Board Using OB2535





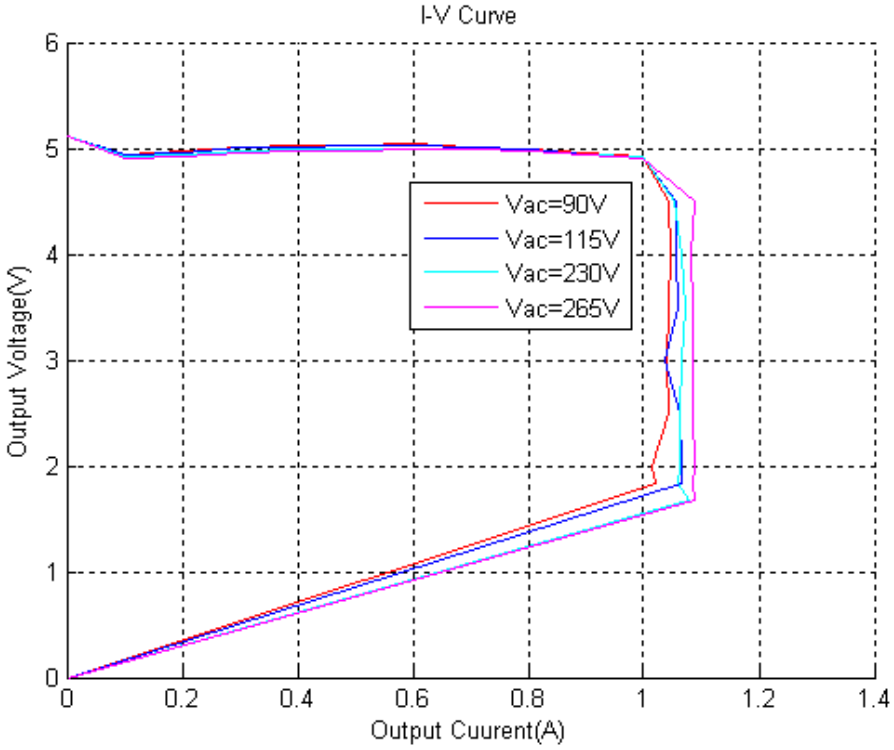
5W(5V/1A) Demo Board Using OB2535

Demon Board Schematic



3. 5W(5V/1A) Demo Board Using OB2535

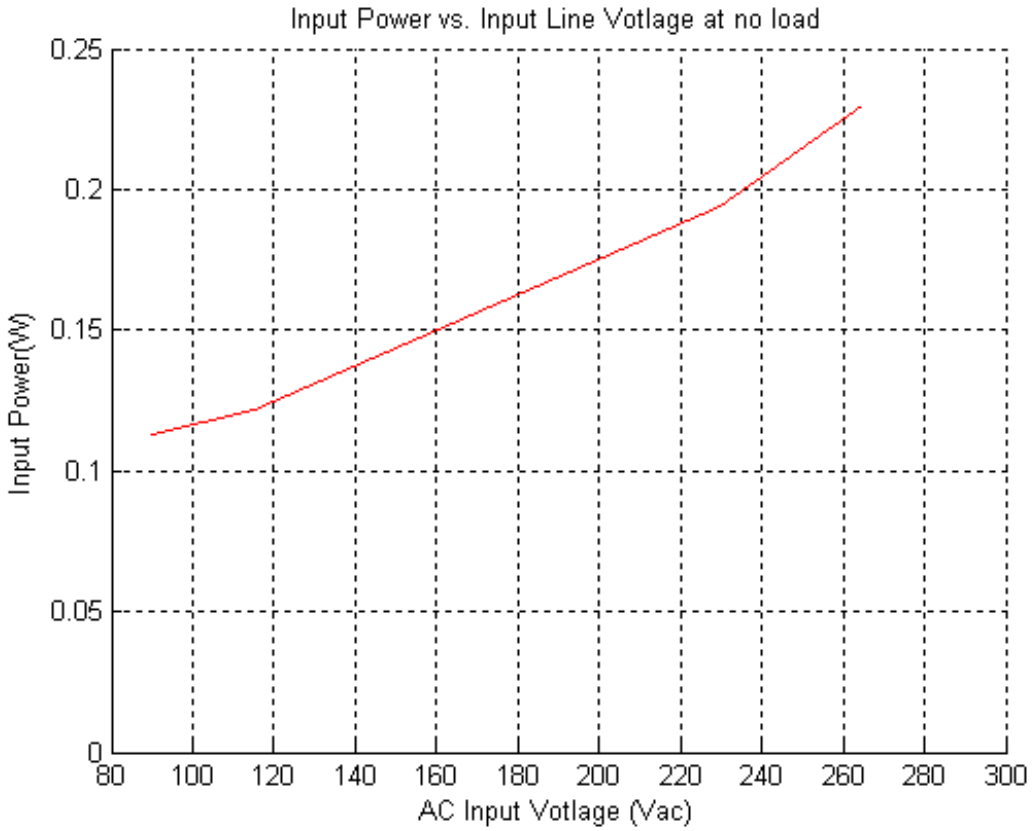
3.4 Electrical Functions: Output I-V Curve



Measurements were taken at the end of 6ft,0.3Ohm,24AWG output cable

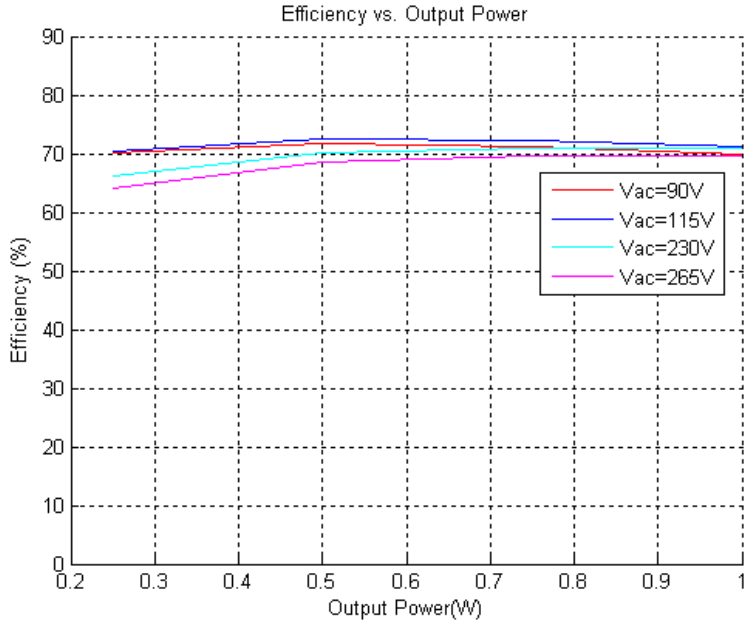
5W(5V/1A) Demo Board Using OB2535

Electrical Functions: Standby Power



5W(5V/1A) Demo Board Using OB2535

Electrical Functions: Efficiency

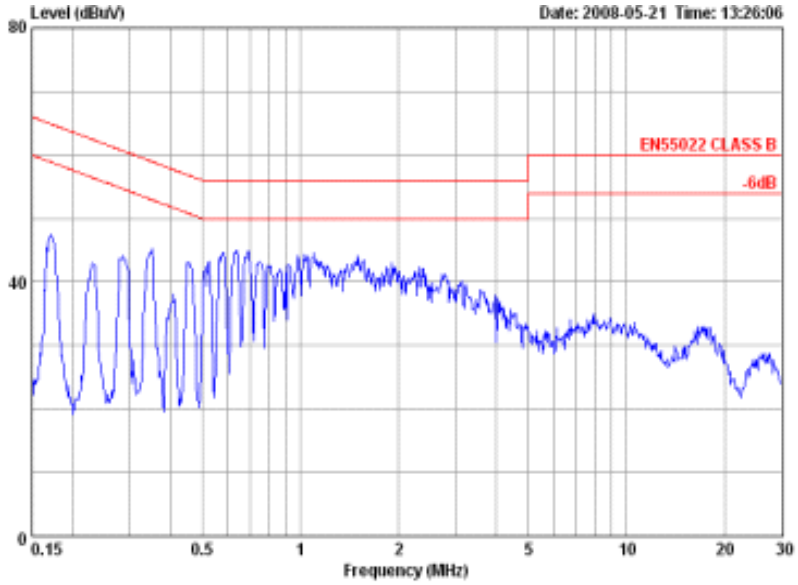


Input voltage	25%	50%	75%	100%	Aver. Eff.	EPS2.0 Level 5.
115Vac/60HZ	70.44	72.5	72.29	71.15	71.6	>68.17%
230Vac/50HZ	66.09	70.09	70.92	70.98	69.52	

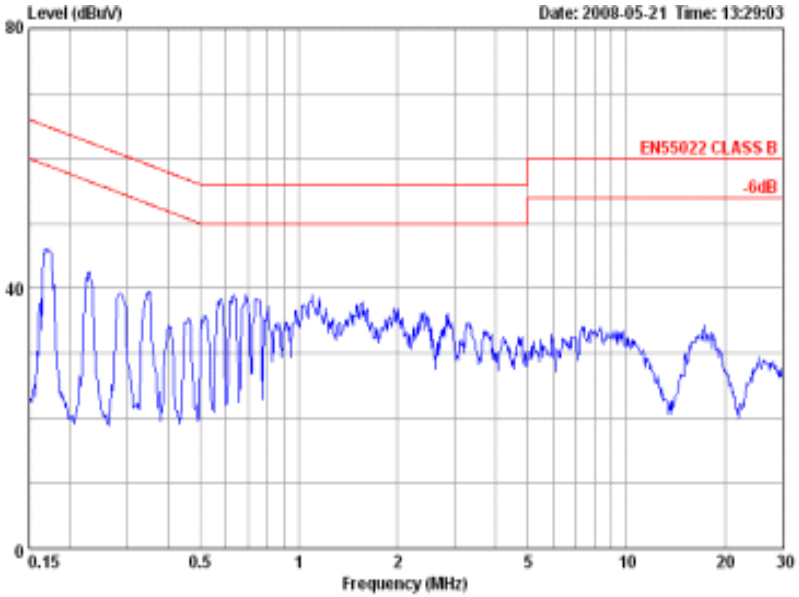
Measurements were taken at the end of 6ft,0.3Ohm,24AWG output cable

5W(5V/1A) Demo Board Using OB2535

EMC Results: Conduction



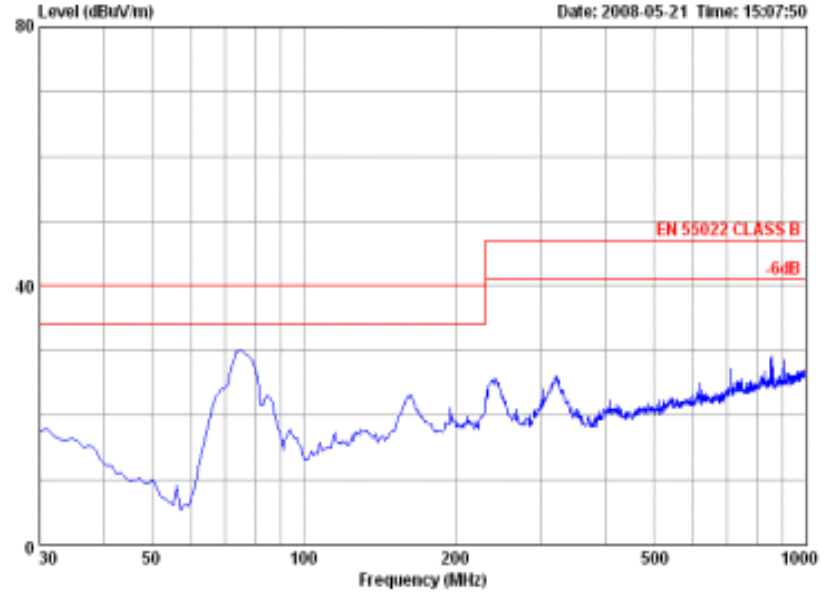
Site	: Audix ACI(Conducted Emission)
Condition	: EN55022 CLASS B ESH3-Z5-08.04.06 LINE
Project No.	:
Applicant	:
EUT	:
M/N	: OB2535
S/N	: 1#F
Power Supply	: 230V/50Hz
Ambient	: 25℃ 55%RH
Test line	: L
Test Mode	: Full Load
Test Engineer	: Tom
Memo	: 5V 1A



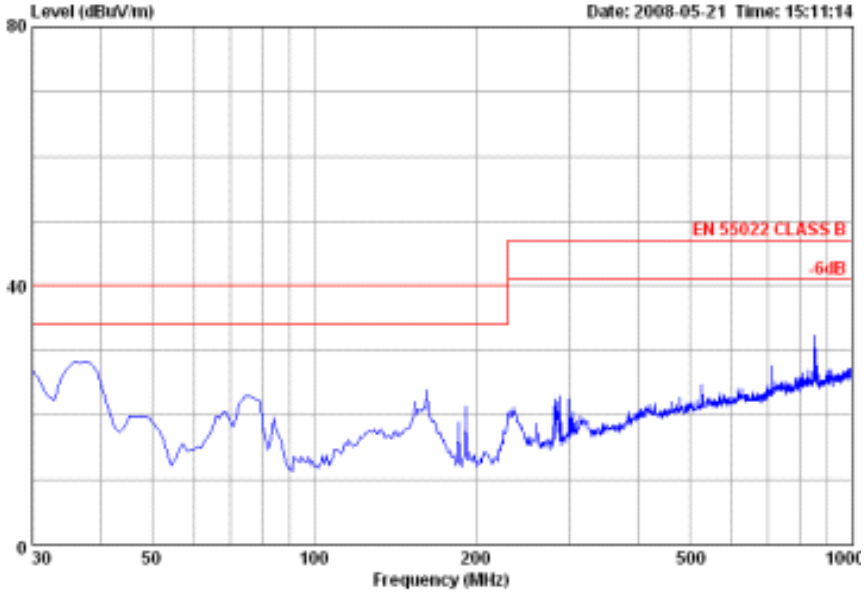
Site	: Audix ACI(Conducted Emission)
Condition	: EN55022 CLASS B ESH3-Z5-08.04.06 NEUTRAL
Project No.	:
Applicant	:
EUT	:
M/N	: OB2535
S/N	: 1#F
Power Supply	: 230V/50Hz
Ambient	: 25℃ 55%RH
Test line	: N
Test Mode	: Full Load
Test Engineer	: Tom
Memo	: 5V 1A

5W(5V/1A) Demo Board Using OB2535

EMC Results: Radiation



Site	: Chamber3
Condition	: EN 55022 CLASS B 3m HORIZONTAL
Project No.	:
Applicant	: On Bright
EUT	: POWER
M/N	: 5V 1A
S/N	: OB2535
Power Supply	: 230V/50Hz
Ambient	: 26'C 52%RH
Test Mode	: FULL LOAD
Test Engineer	: Leo
Memo	: 1#P
Memo	:



Site	: Chamber3
Condition	: EN 55022 CLASS B 3m VERTICAL
Project No.	:
Applicant	: On Bright
EUT	: POWER
M/N	: 5V 1A
S/N	: OB2535
Power Supply	: 230V/50Hz
Ambient	: 26'C 52%RH
Test Mode	: FULL LOAD
Test Engineer	: Leo
Memo	: 1#P
Memo	:

PWM Power Switch-OB235X

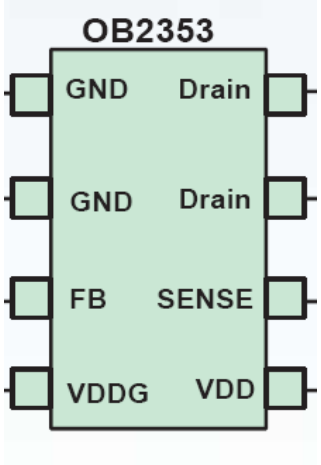
Features:

- Integrated High Voltage Power MOSFET
- NO-Y, NO-X Design
- Power on-soft start (4ms)
- Low Operation Current→ Low standby
- Extended Burst Mode→ Low standby
- Over Load Protection
- Frequency Shuffling→ Easy EMI design
- Built-in OCP with line voltage compensation
- Leading Edge Blanking at CS Input
- VDD OVP
- UVLO

Applications:

AC/DC SMPS up to 7W

- Cell Phone Charger
- Digital Camera Charger
- Auxiliary Power for White Goods, PC, TV
- Linear Regulator Replacement

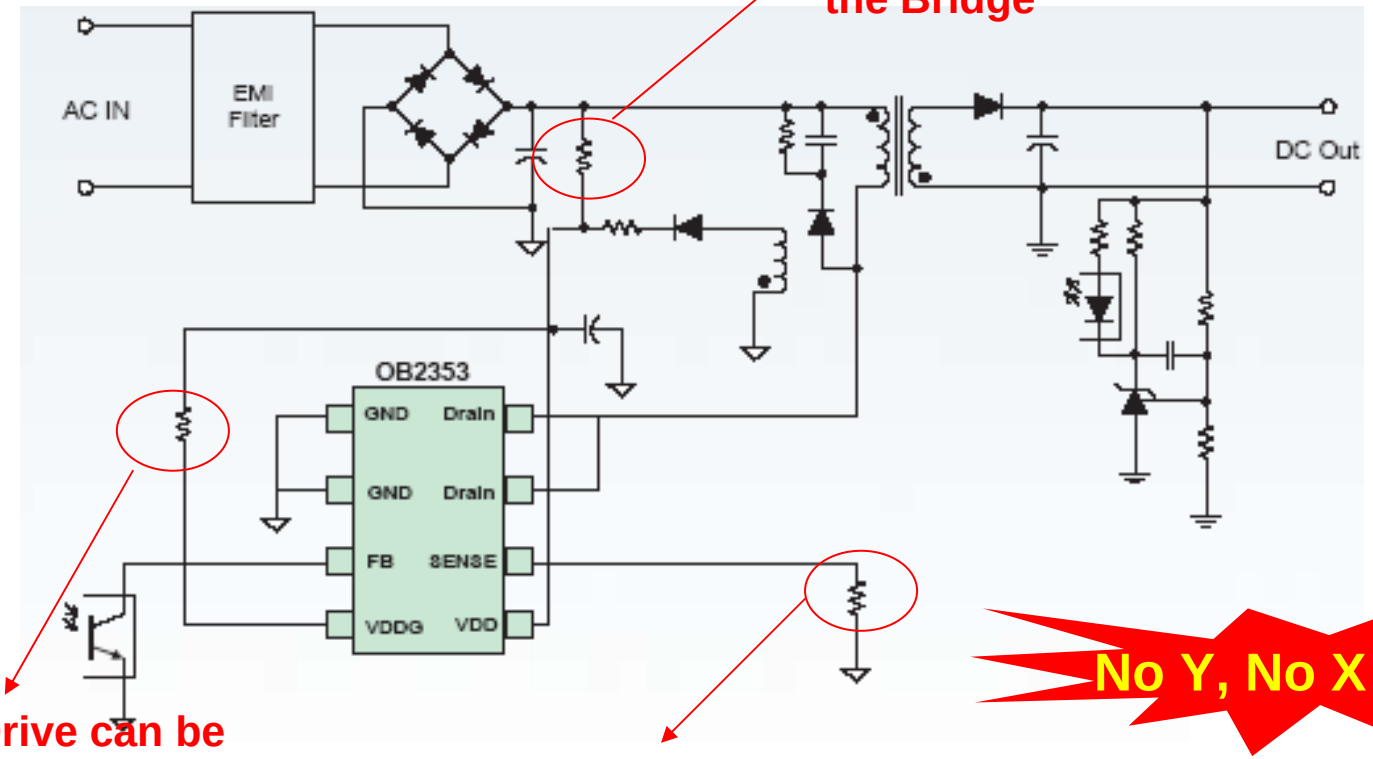


2.机顶盒电源解决方案

同类产品性能比较

Feature	OB2354	OB2358	FSDH321	FSDM0265	Viper22	TNY268	NCP1014
Package	DIP-8	DIP-8	DIP-8	DIP-8	DIP8/SOP8	DIP8	DIP
Power Switch	Y	Y	Y	Y	Y	Y	Y
Rds(Ohms)	10	4	14	5	15	5.2	11
Max power (W)	16W	24W	17W*	27W*	20W* (DIP)	23W	19W*
Wide Range VDD	9-32V	9-32V	8-20V	8-20V	9-38V	NA	NA
Cycle-by-Cycle Current Limiting	Y	Y	Y	Y	Y	Y	Y
OCP Line Compensation	Y	Y	N	N	N	N	N
Adjustable Gate Driver	Y	Y	N	N	N	N	N
Frequency Jittering	Y	Y	Y	Y	N	Y	Y
Soft Start	Y	Y	Y	Y	N	N	Y
OLP	Y	Y	Y	Y	N	N	N
Audio Noise Free	Y	Y	Y	Y		Y	Y

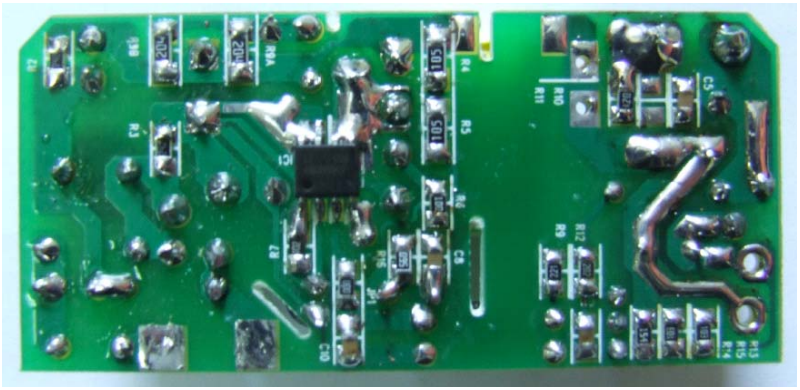
Application Scheme



5V/1A Adapter Module Using OB2353

Key features:

- No Y cap, No X cap, No Common Choke, No Differential Choke
- Passed EN55022 Class B & FCC Part Class B
- Passed EN61000-4-2
- Driver NPN, Lower System Cost
- Standby Power <0.17W@ 240VAC
- Standby Power <0.78W@ 0.40W Load
- Efficiency >75%
- OVP, OCP, SCP Protection and Auto Recovery
- Soft Start to Relax the Component Rating Requirement

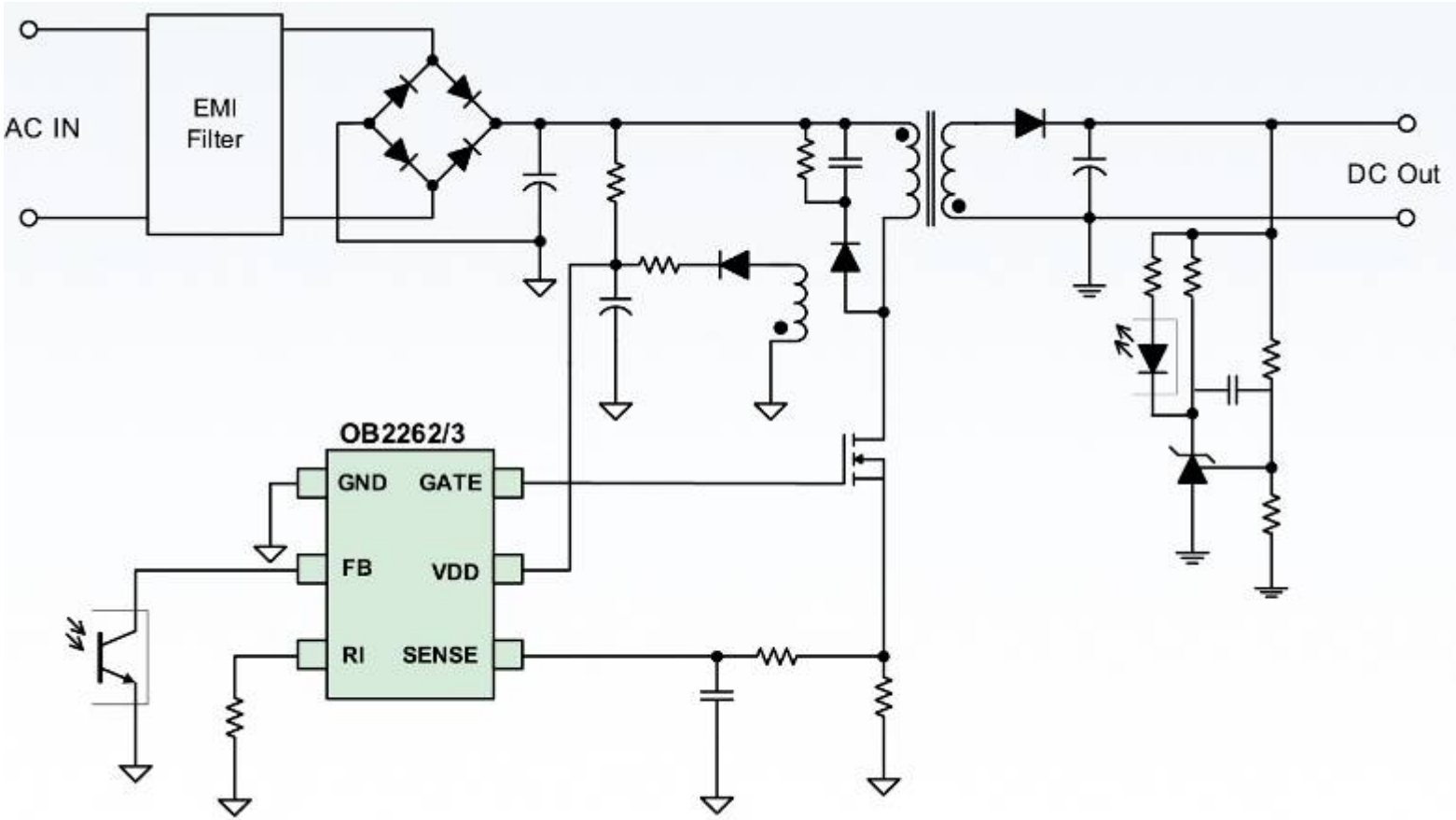


PWM Controller - OB2262/3

High Performance AC/DC Controller - Small to Medium Power

Feature	OB2262	OB2263
UVLO	Y	Y
OVP	Y	Y
Cycle-by-Cycle OCP	Y	Y
OLP	Y	Y
SCP	Y	Y
OTP	N	N
VDD Clamp	Y	Y
Auto Recovery	Y	Y
Latch Shutdown	N	N
Extended Burst Mode	Y	Y
Frequency Shuffling	N	Y
Audio Noise Free	Y	Y

Application Scheme



15W Adapter: OBPD15W-L120A

Key Features

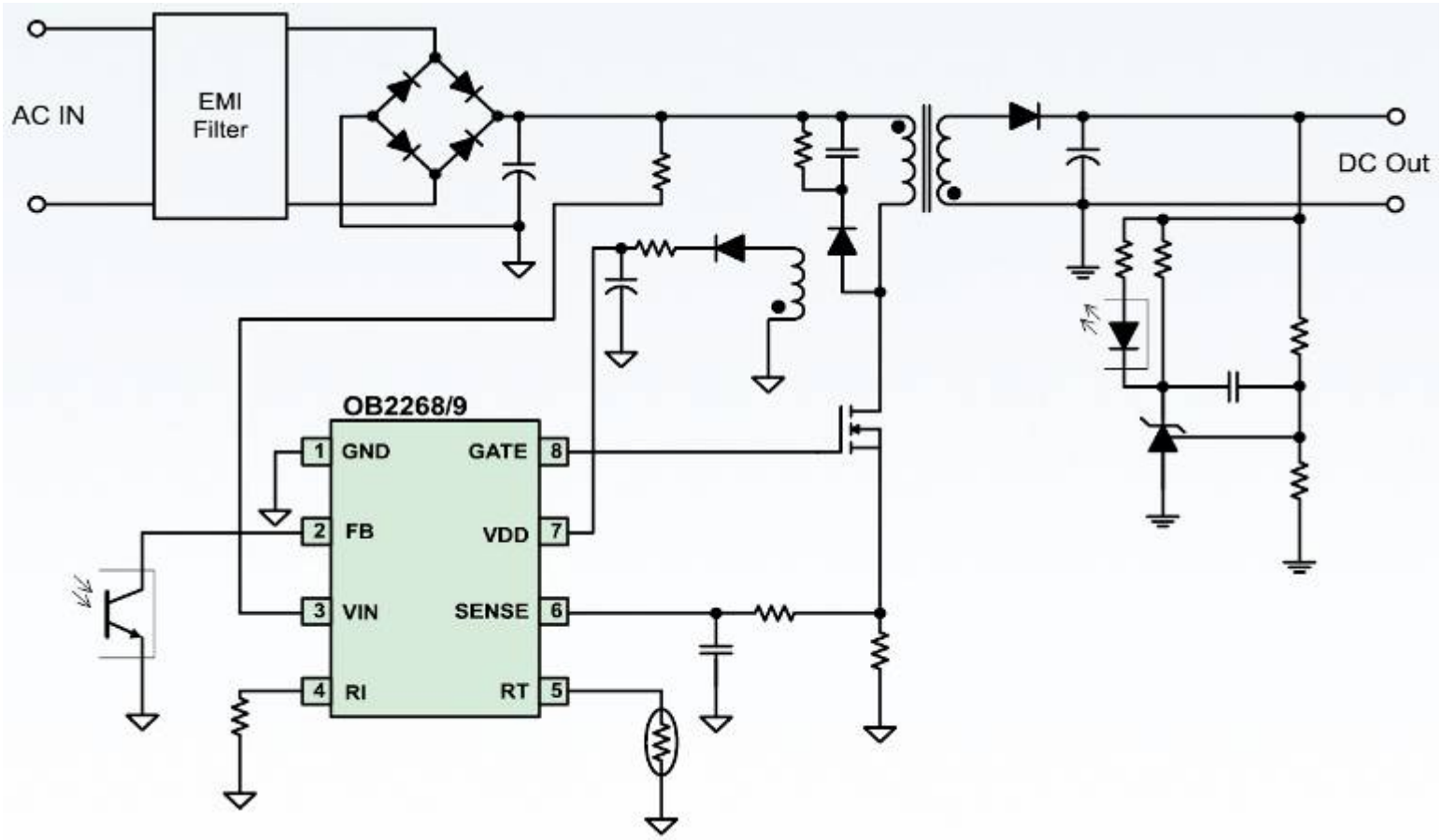
- Input AC 90V to 264V
- Output 12V/ 1.25A
- Ripple & Noise < 100 mV
- Audio Noise Free
- OCP with Line Compensation
- Efficiency ⩾83.5% Over 90Vac~264Vac @ Full load
- Standby Power **0.15W** @ 240Vac/50HZ

PWM Controller - OB2268/69/78/79

High Performance PWM Controller – Medium Power

Feature	OB2268/69	OB2278/79
UVLO	Y	Y
OVP	Y	Y
OCP Compensation	Y	Y
OLP	Y	Y
OTP	Y	Y
VDD Clamp	Y	Y
Soft start	N	Y
Auto Recovery	Y	Selective
Latch Shutdown	N	Selective
Extended Burst Mode	Y	Y
Frequency Shuffling	Y in 69	Y in 79
Audio Noise Free	Y	Y

Application Scheme



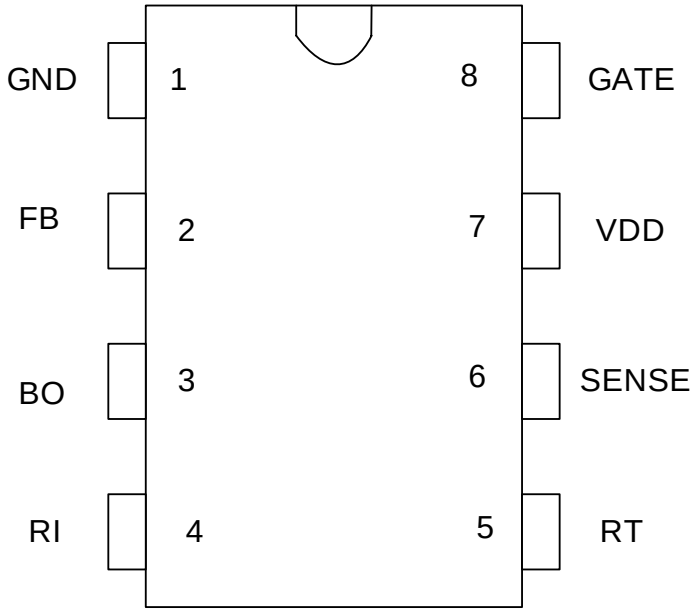
56W Notebook Adapter OBPD56W-L160A

Key Features

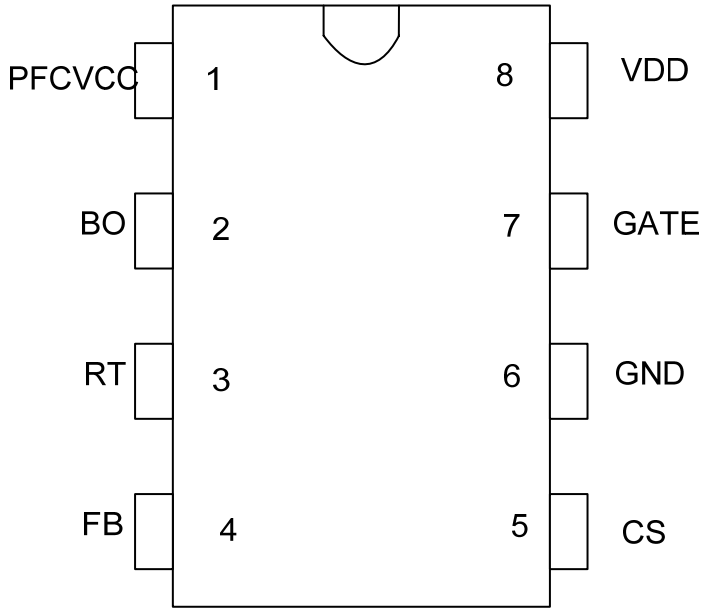
- Input 90V to 264VAC
- Output +16.0V/3.5A
- Standby Power **< 0.195W** @ 240Vac/50Hz
- Standby Power of **0.70W** @ load of **0.4W**
- OCP with Line Compensation
- >85% Efficiency Over 90Vac ~264Vac.
- **OCP/OPP** Value Over 90V - 264Vac is **1.10~1.16X** of Rated Output Current.
- Pass 15kV ESD

High Performance PWM Controller - OB228X/OB2298

OB2287/OB2288



OB2298



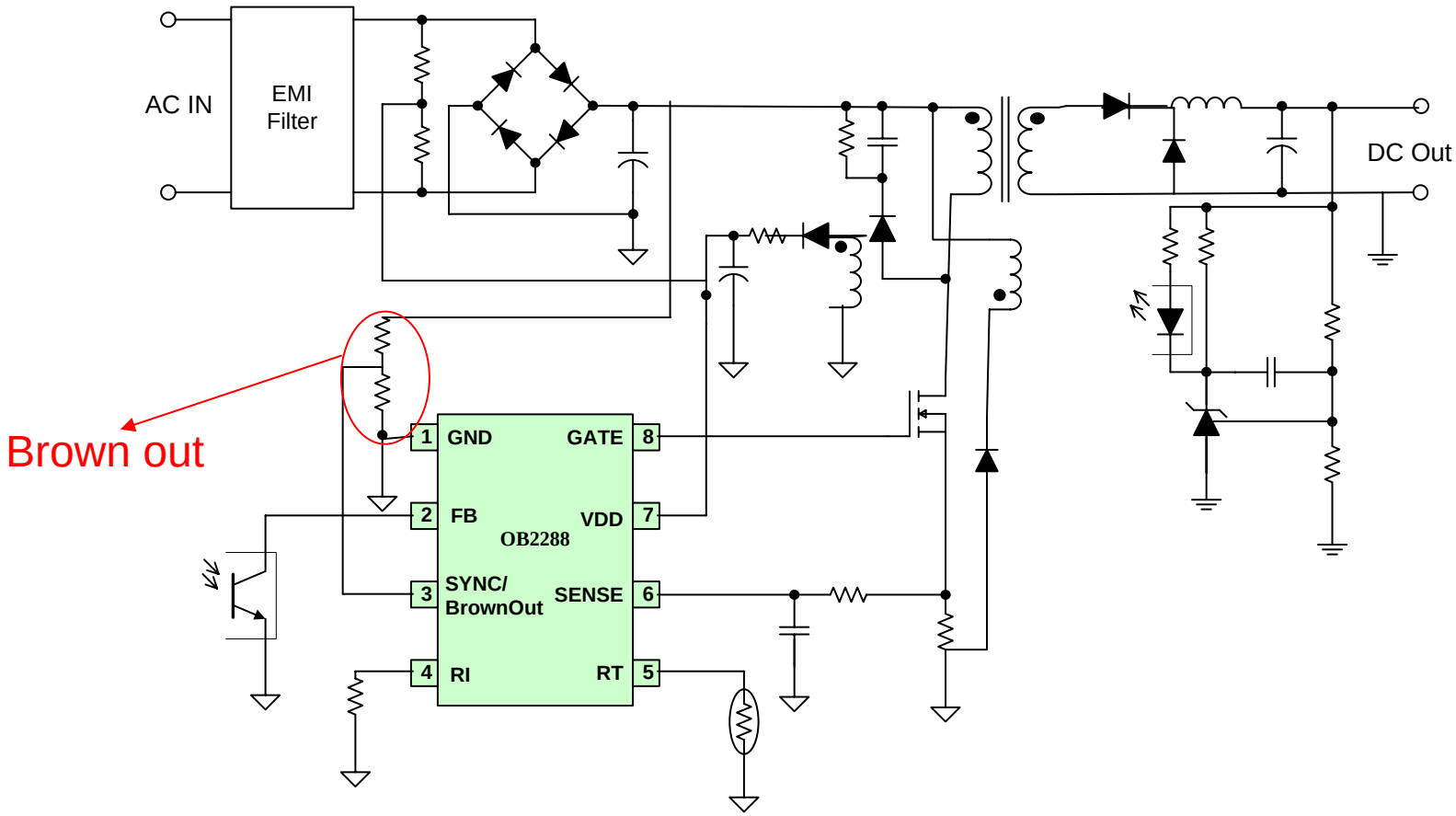
OB2288 is suitable for forward mode with maximum duty cycle of 50%

Features

Feature	OB2288	OB2287
Topology	Forward	Flyback
OVP	Y	Y
OCP plus Compensation	Y	Y
OLP	Y	Y
OTP	Y	Y
Brown out protection	Y	Y
Soft start	Y	Y
Auto Recovery	Y	Y
Latch Shutdown	Selective	Selective
Extended Burst Mode	Y	Y
Frequency Shuffling	Y	Y
Audio Noise Free	Y	Y

Ultra Low SCP Input Power Design with Built-in Holding Timer Design

PWM Controller - OB2287/88



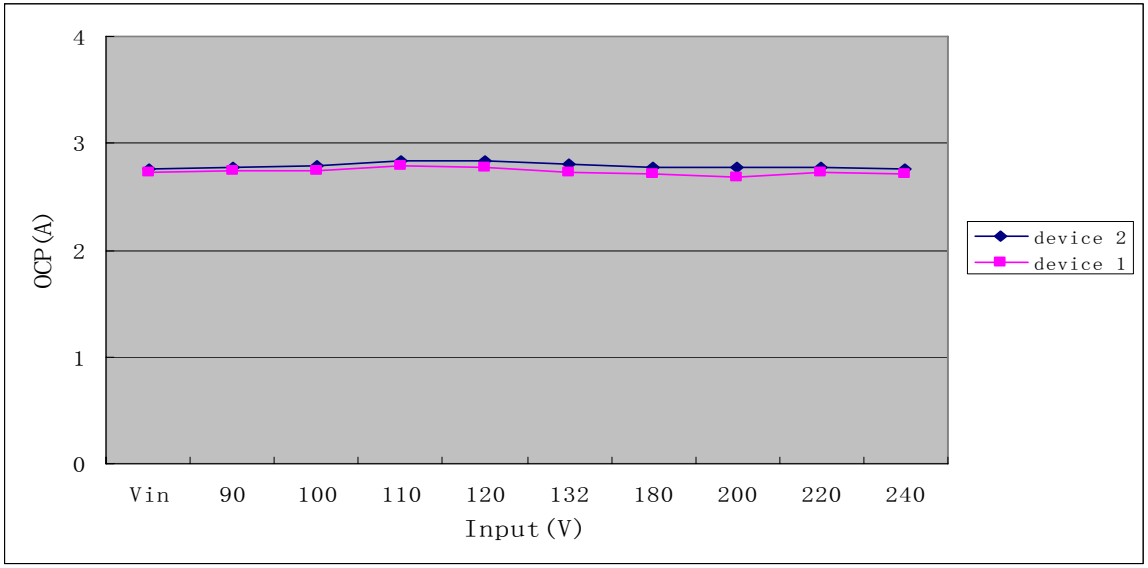
OB2287 40W(19V/2.2A) Demo Board Performance

Patened "Constant OCP Compensation Technology"

Test board 1: 40W(19V/2.2A)

Test result:

Input		90V	100V	110V	120V	132V	180V	200V	220V	240V	264V
OCP(A)	device 1	2.73	2.74	2.74	2.79	2.78	2.73	2.71	2.68	2.73	2.71
	device 2	2.76	2.78	2.79	2.84	2.84	2.8	2.78	2.77	2.77	2.76



Note: CCM/DCM full load switch at 180VAC, Full load duty cycle at 90VAC is 45%.

Key Performance Comparison Matrix

Feature	OB2287/ OB2288	OB2298*	SG6846
PFC control	N	Y	N
OCP Compensation	Y	Y	Y
OVP	Y	Y	Y
OLP time	250ms	225ms	96ms
Gate drive capability	1.5A	1.5A	?
Soft Start time	4ms	4ms	N
Brown out protection	Y	Y	Y
OTP	Y	Y	Y
Frequency shuffling	Y	Y	N
Restart timer	N	1s	N

* PFC is required for Power greater than 75W

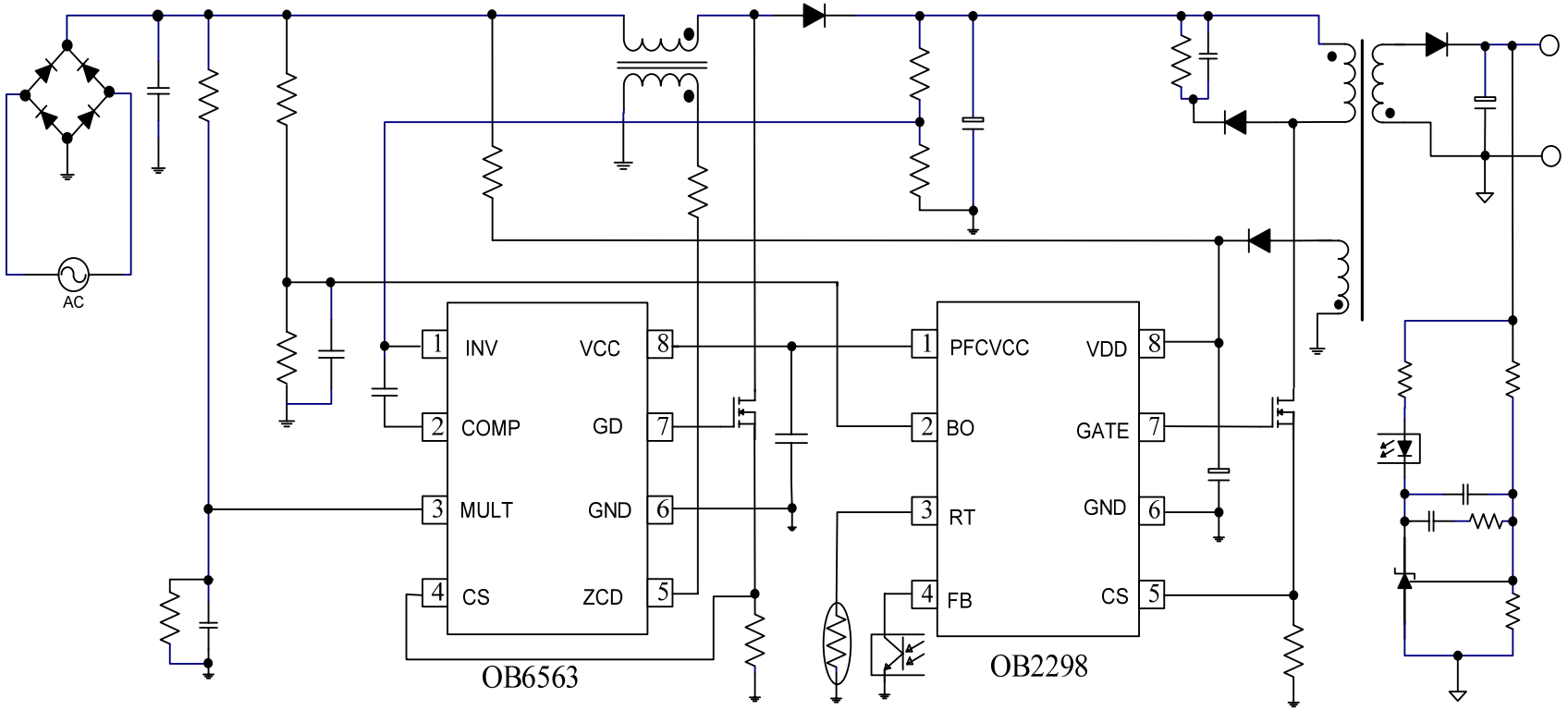
OB2298 Highlight

- Precise (1%) Brown out protection
- Over Temperature Protection (OTP)
- All Pins Floating Protection
- Proprietary “Nonlinear duty cycle OCP compensation”
- 1 Sec Restart Timer

OB2298 Performance Comparison Matrix

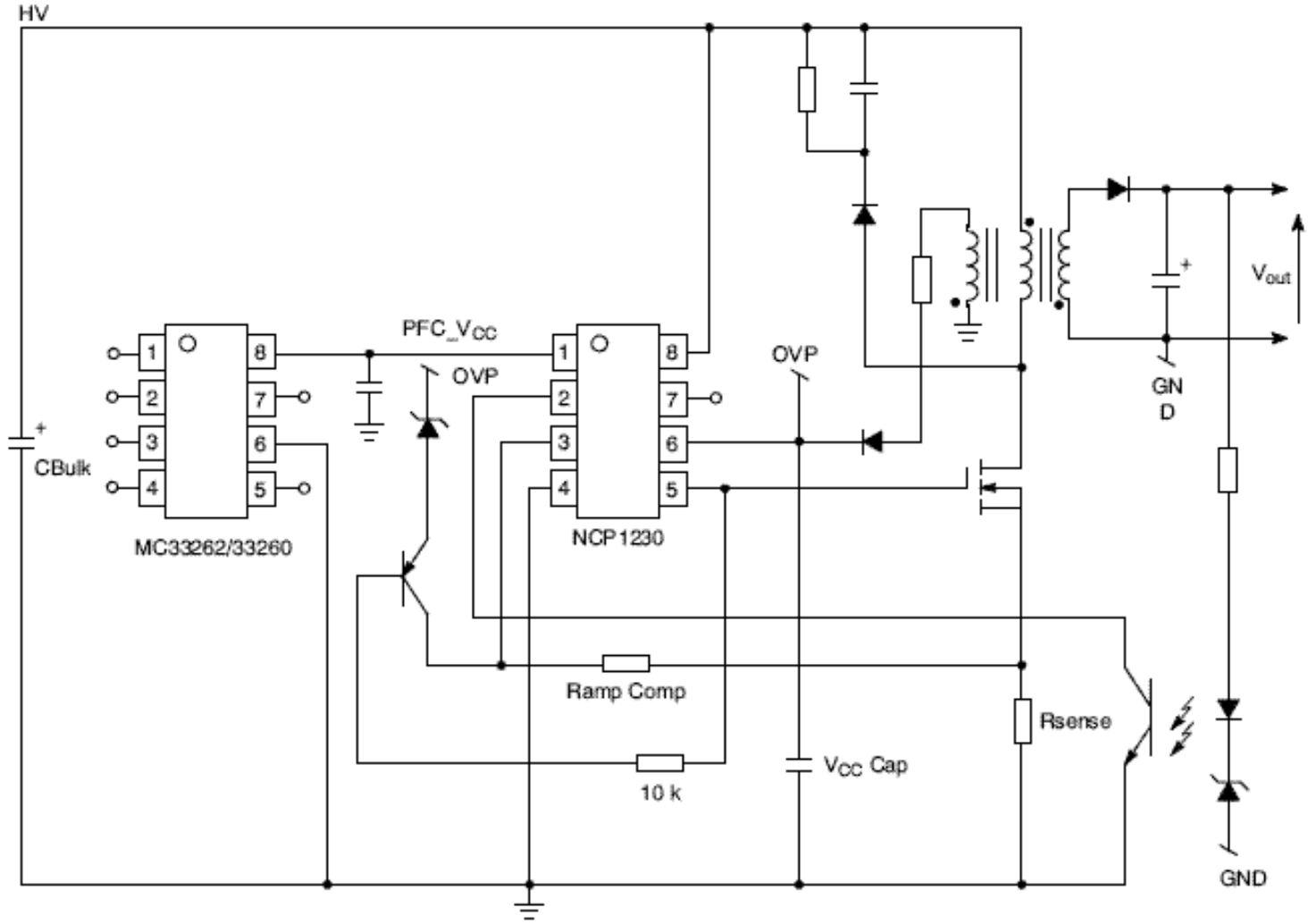
Feature	OB2298	NCP1230
High voltage startup	N	Y
Built in PFC control and PFC supply switch	Y	Y
OTP using external NTC resistor	Y	N
Frequency jittering	Y	Y
OLP time (ms)	225	125
External Latch trigger	RT pin	CS pin
Gate drive capability	1A	0.8A
Soft Start time	4ms	2.5ms
Max. FB pin source current	1.1mA	0.25mA
Brown out protection	Y	N
Pin floating protection	Y	N
Restart timer	1s	N

OB2298 Application Diagram

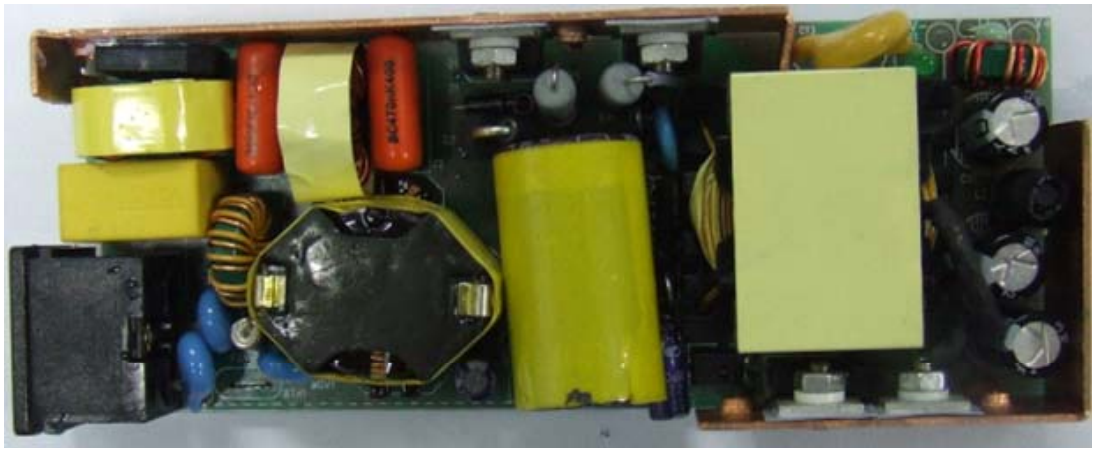


OB2298 vs. NCP1230

NCP1230 Application Diagram



90W (19V/4.74A) Adapter Solution Using OB2298+OB6563



PFC Controller – OB6561P/OB6563

- STM L6561/2 Pin Compatible
- Design Optimized for 75-250W Apps in SMPS Power and Lighting
- Excellent Power Factor Achieved
- Excellent Harmonic Distortion Control
- **Open Loop Protection**
- **Audio Noise Free→ The Best in the Category**
- Wide Range of VCC

Performance Comparison Matrix

Feature	OB6561P/ 6563	L6561 /6562	TDA4863
THD optimizer	Y	L6562 only	N
Audio noise free	Y	N	N
Open loop protection	Y	N	Y
Current threshold For Dynamic output OVP	40uA (6561P) 10uA (6563)	40uA	40uA
Feedback sense resistor (ohms)	1M (6561P) 4M (6563)*	1M	1M
Max VDD (V)	30	20	20

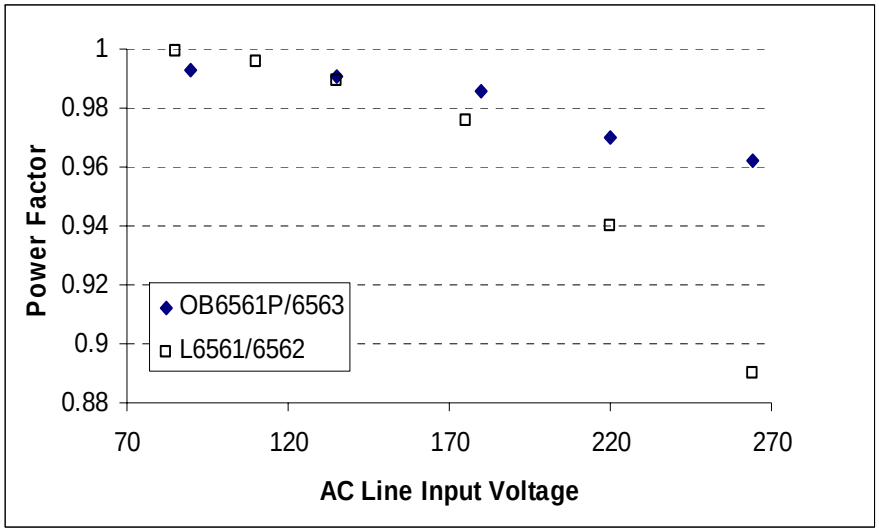
* Lower standby power can be achieved, Standby power could less than <0.5W in 90W adapter application.

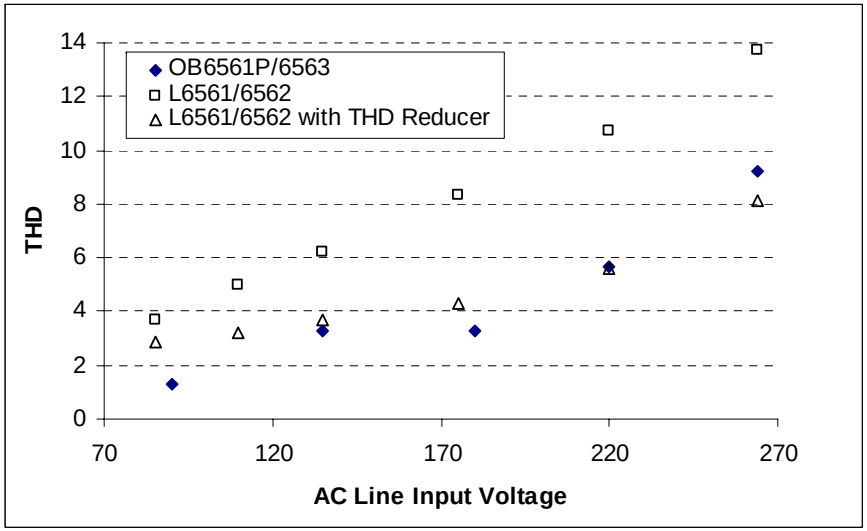
OB6561P/OB6563 Key Performance Comparison With L6561/2 (Full load)

	PF			THD (%)		
Vin(Vac)	OB6561P /6563	L6561* w/o THD reduces	L6561* With THD reduces	OB6561P/6563	L6561* w/o THD reduces	L6561* With THD reduces
85		0.999	0.999		3.7	2.9
90	0.993			1.3		
110		0.996	0.996		5.0	3.2
132/135	0.991	0.989	0.989	3.3	6.2	3.7
175		0.976	0.976		8.3	4.3
180	0.986			3.3		
220	0.970	0.940	0.941	5.7	10.7	5.6
264	0.962	0.890	0.893	9.2	13.7	8.1

* Data from published demo board report.

OB6561P/6563 Key Performance Comparison With L6561/2 (Full load)



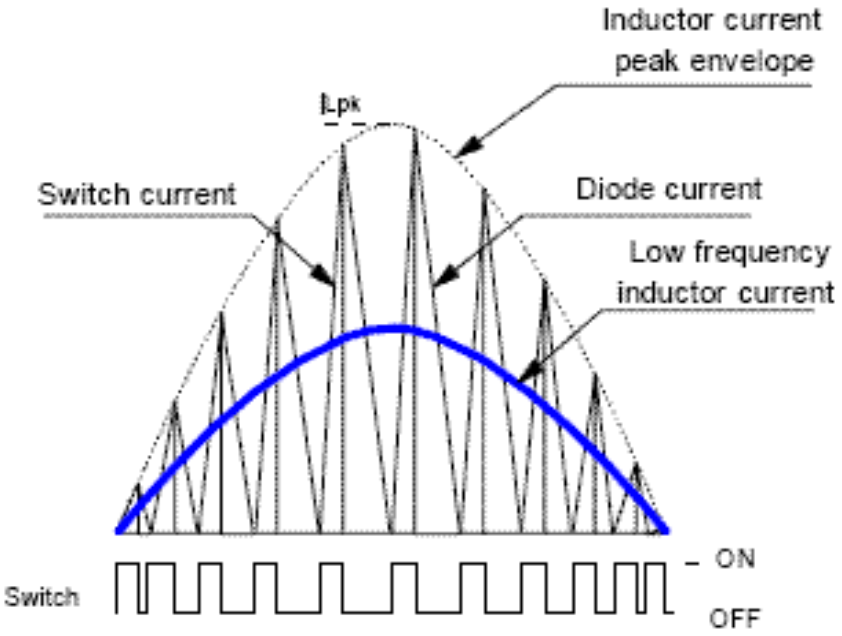


* Data from published demo board report.

PFC Controller Comparison Table								
Feature	OB6561P/ OB6563	L6561/2	UCC28050	FAN7527	FAN7529/30	MC34262	AUK S6500	TDA4863
THD optimizer	Y	L6562 only	Y	N	Y	Y	N	Y
Audio noise free at full loading	Y	N	N	N	?	N	N	N
open loop protection	Y	N	Y	N	Y	N	Y	Y
Feedback sense resistor	1M(OB6561P) 4M(OB6563)	1M	GmC type	1M	820K(AUX)	GmC type	1M	1M
VCC range	28V	18V	20V	30V	22	30V	18V	20
VDD clamp	30V	20V	30V		22	36V	20V	20
OVP trigger current	40uA(OB6561P) 10uA(OB6563)	40uA	?	40uA	2.675V/2.5V	?	40uA	40uA
min. MULT linear input range	0-3.5V	0-3V	0-3.5V	0-3.8V	?	0-3.5V	0-4.5V	0-4V
ZCD disable threshold (mV)	250mV	200mV	300mV	450mV	650mV	300mV	400mV	400mV
ZCD upper clamp (V)	5.7V	5.1V	6V	7.9V	6.5	6.7V	7.5V	5.4
GD output clamp (V)	16V	=VDD-Vcesat	13V	16V	13	10.3V	10V	10.8
Vzcd threshold voltage(i/p)	1.9V	2.1V	1.7V	2V	1.5	1.6V	2V	1.5
Package	SOP-8 DIP-8	SOP-8 DIP-8	PSOP-8 PDIP-8	SOP-8 DIP-8	SOP-8 DIP-8	SOP-8 DIP-8	SOP-8 DIP-8	SOP-8 DIP-8

8 Pin CCM PFC Controller -OB6573/6572

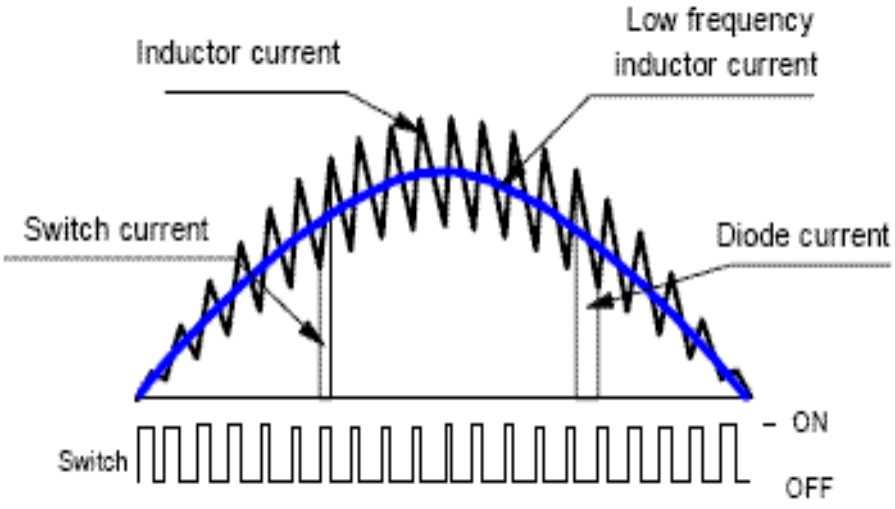
CCM PFC vs. TM PFC



TM PFC

Recommend Power range:

<300W



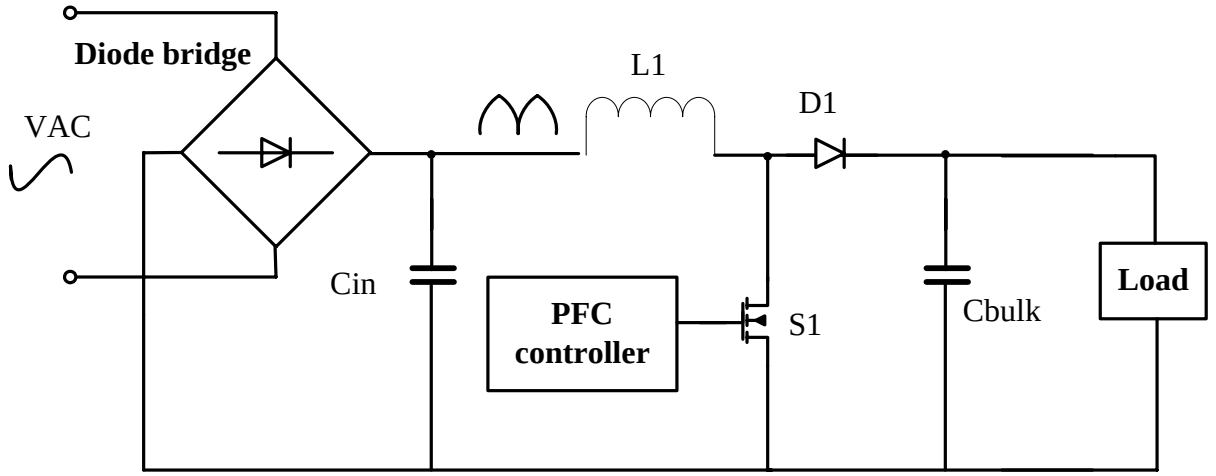
CCM PFC

Recommend Power range:

>250W

8 Pin CCM PFC Controller -OB6573/6572

OB6563 vs. OB6573



	OB6563	OB6573
S1	Soft switch	Hard switch
D1	No need of fast recovery	Need fast recovery
Inductor	High rms current, high loss	Low rms current, low loss
Input filter	Large	Small

8 Pin CCM PFC Controller -OB6573/6572

Features

- 8-Pin solution without sensing line voltage
- Average current control mode
- Frequency shuffling for better EMI
- Very low shutdown currents (typ. 200uA)
- **Pin short circuit protection**
- Comprehensive protections: Cycle-by-cycle current limit, Soft OCP, Open loop protection, Enhanced dynamic response, Soft start, On chip thermal shutdown
- Fast 1.5A gate drive.
- Programmable brown-out protection (OB6573)
  - **Programable brown-out hysteresis(like NCP1654)**
- Programmable switching frequency (OB6572) (OB6573 fixed 65KHz)

8 Pin CCM PFC Controller -OB6573/6572

Applications

- LCD /Flat TV Power
- Desktop and PC Sever Power Supplies
- AC Adapters and other Off-line SMPS
- Telecom Rectifiers

- Pin to Pin compatible with Infineon/On-Semi/IR
  - ICE1PCS02 / ICE2PCS02/ NCP1654/ UCC28019
  - ICE1PCS01 / ICE2PCS01/ ICE2PCS03/04/05
  - IR1150

8 Pin CCM PFC Controller -OB6573/6572

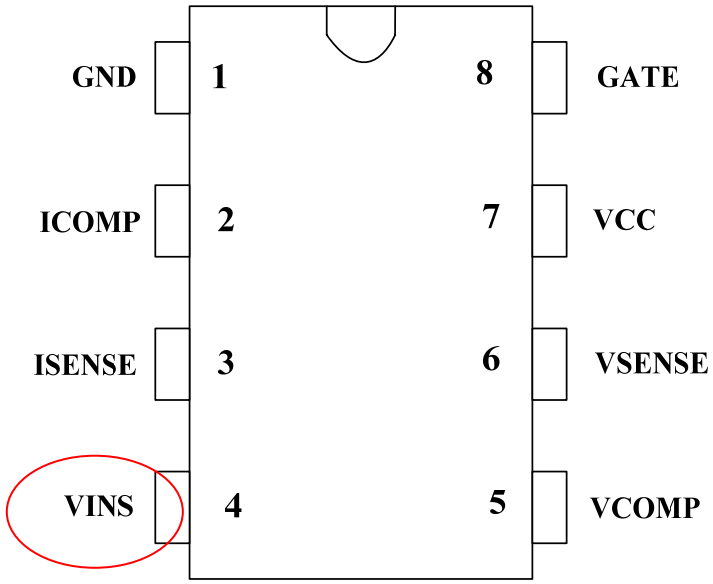
Programmable Frequency in OB6572

- Programmable frequency can optimize **THD**. The higher switching frequency, the lower THD
- Programmable frequency can optimize **boost inductor size**. The higher switching frequency, the smaller boost inductor.
- Programmable frequency can optimize **inductor current ripple**. The higher switching frequency, the smaller inductor current ripple.
- Programmable frequency can optimize **max. output power capability**. The higher switching frequency, the larger max. output power capability.

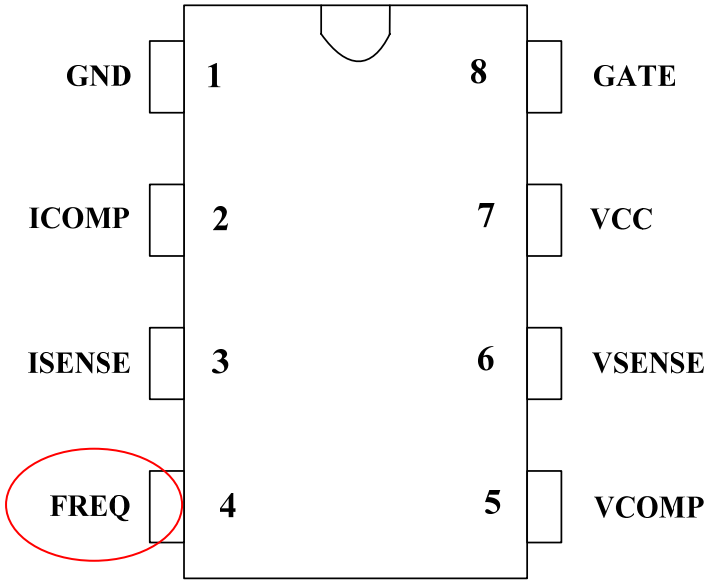
8 Pin CCM PFC Controller -OB6573/6572

Pin Assignments

OB6573



OB6572



Pin to Pin compatible with:

ICE1PCS02 / ICE2PCS02/ ICE2PCS03/ ICE2PCS04

NCP1654

UCC28019

If No Brownout needed

Pin to Pin compatible with:

ICE1PCS01 / ICE2PCS01/ ICE2PCS05

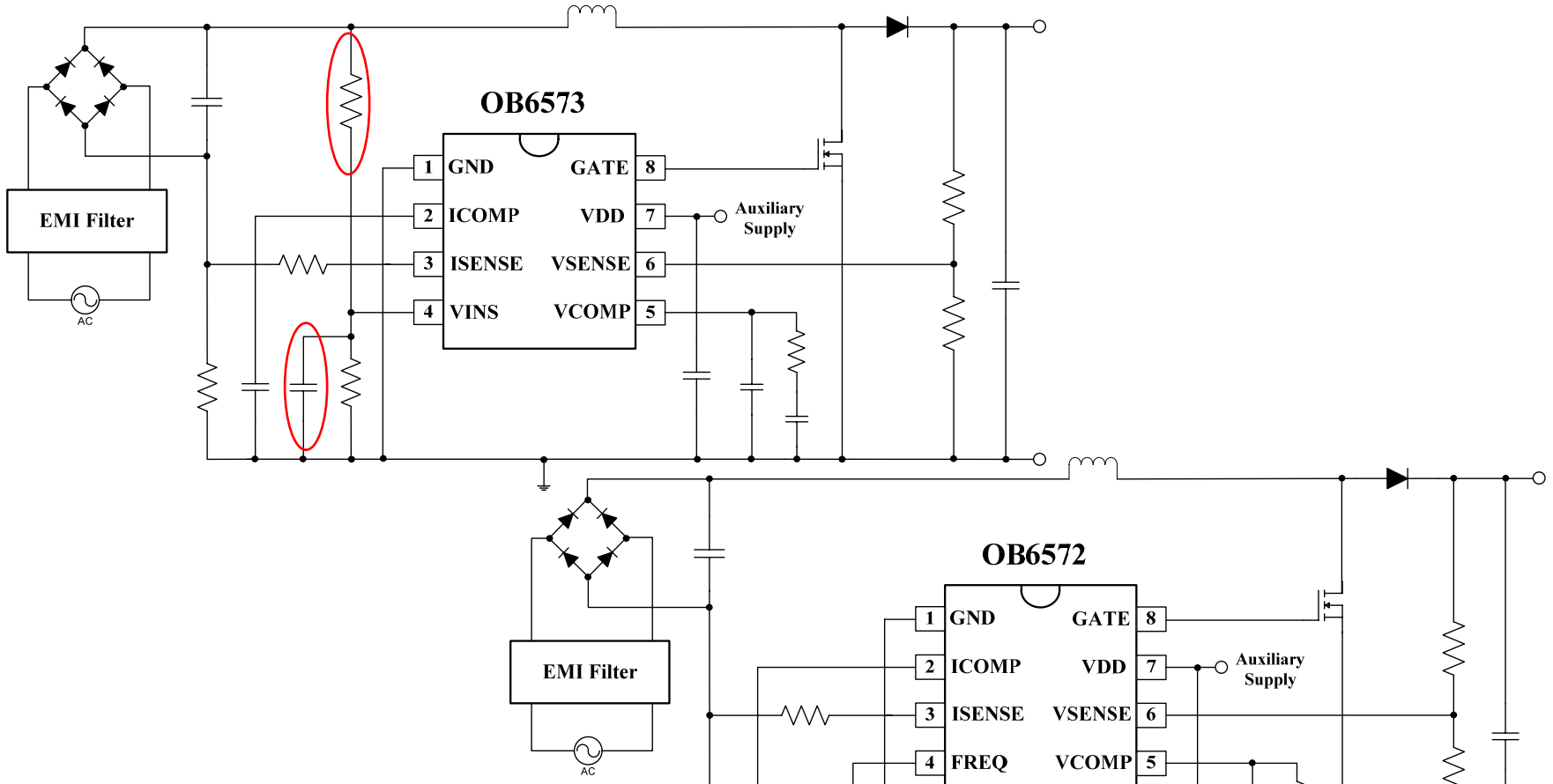
8 Pin CCM PFC Controller -OB6573/6572

8-pin CCM PFC Controller Performance Comparison Matrix

Feature	OB6573/ OB6572	ICE1PCS01/ ICE1PCS02	ICE2PCS01/ ICE2PCS02	UCC28019	NCP1654/3	IR1150
Indirect sensing line voltage	Y	Y	Y	Y	Y	Y
Frequency Shuffling	Y	N	N	N	N	N
Max Startup current (uA)	100	100	450	100	75	175
Typ. Stdby current	200uA	2.6/2.3mA	700uA	2.1mA	300uA	200uA
Pin short circuit protection	Y	N	N	N	N	N
Adjustable Brown-out Hysteresis	Y	N	N	N	Y	N
THD optimization @ Light loading	Y	Y	Y	Y	N	N
Non linear gain for loop compensation	Y	Y	Y	Y	Y	N
Max VDD (V)	28	21	25	21	20	20

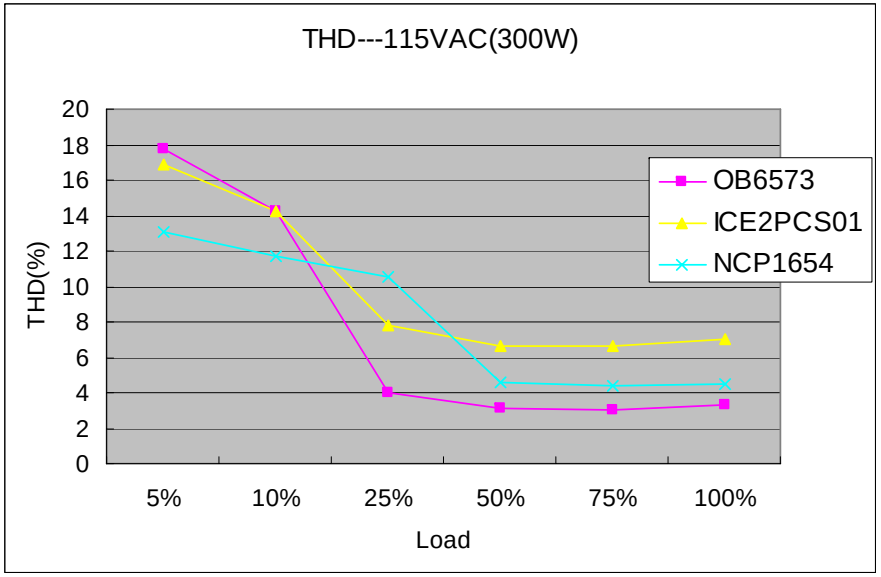
8 Pin CCM PFC Controller -OB6573/6572

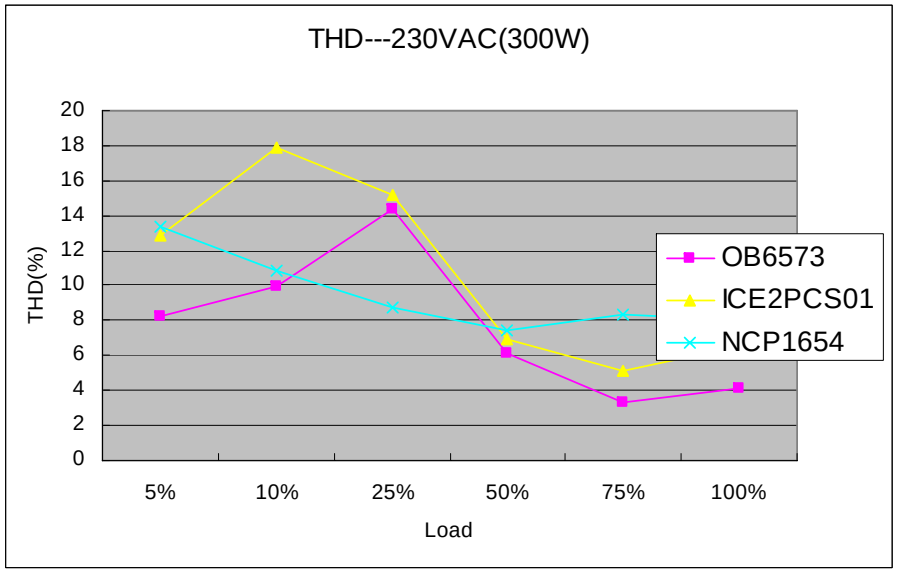
Application Diagram



8 Pin CCM PFC Controller -OB6573/6572

System Performance Comparison

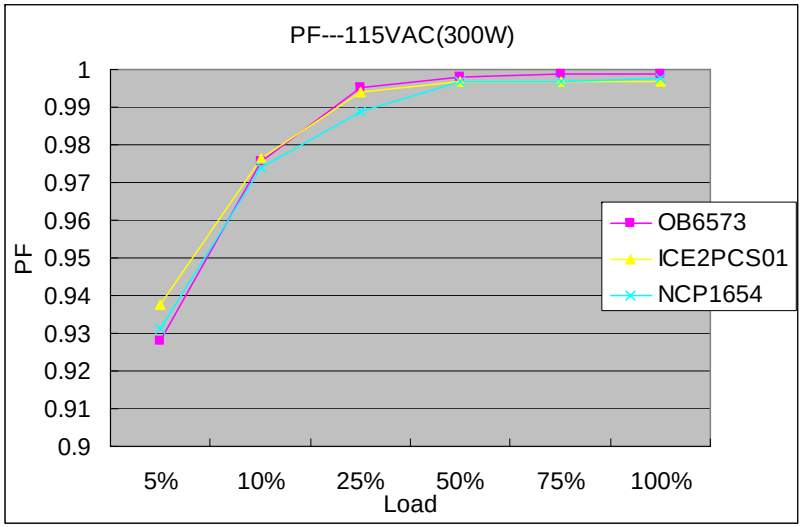


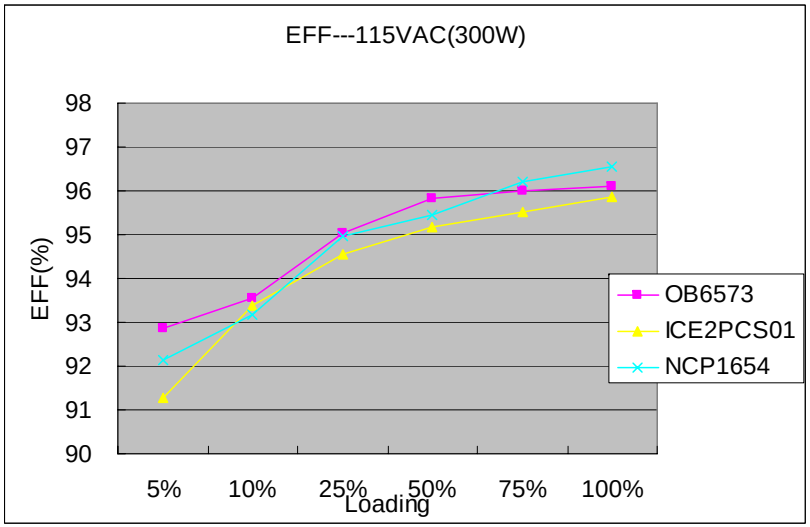


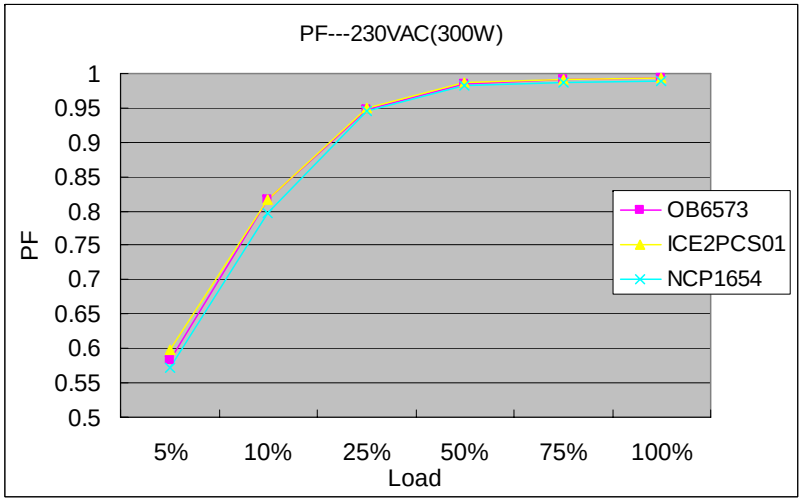
Note: All measurement results are conducted from same board, with all ICs are tuned according to its typical spec.

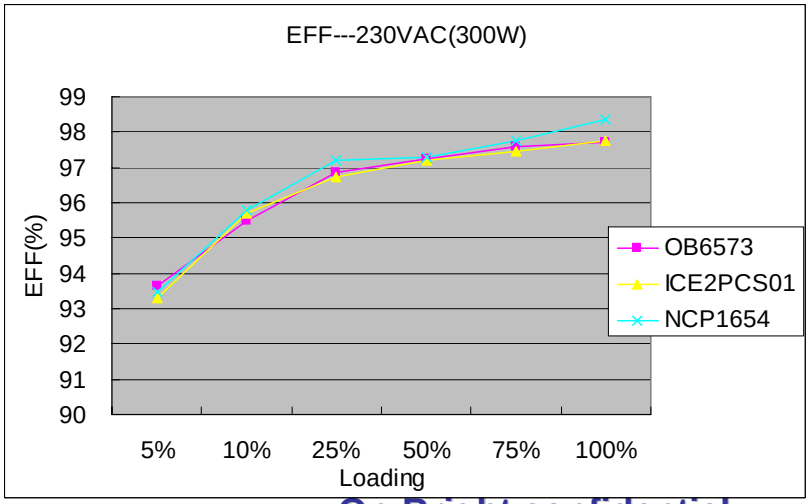
8 Pin CCM PFC Controller -OB6573/6572

System Performance Comparison



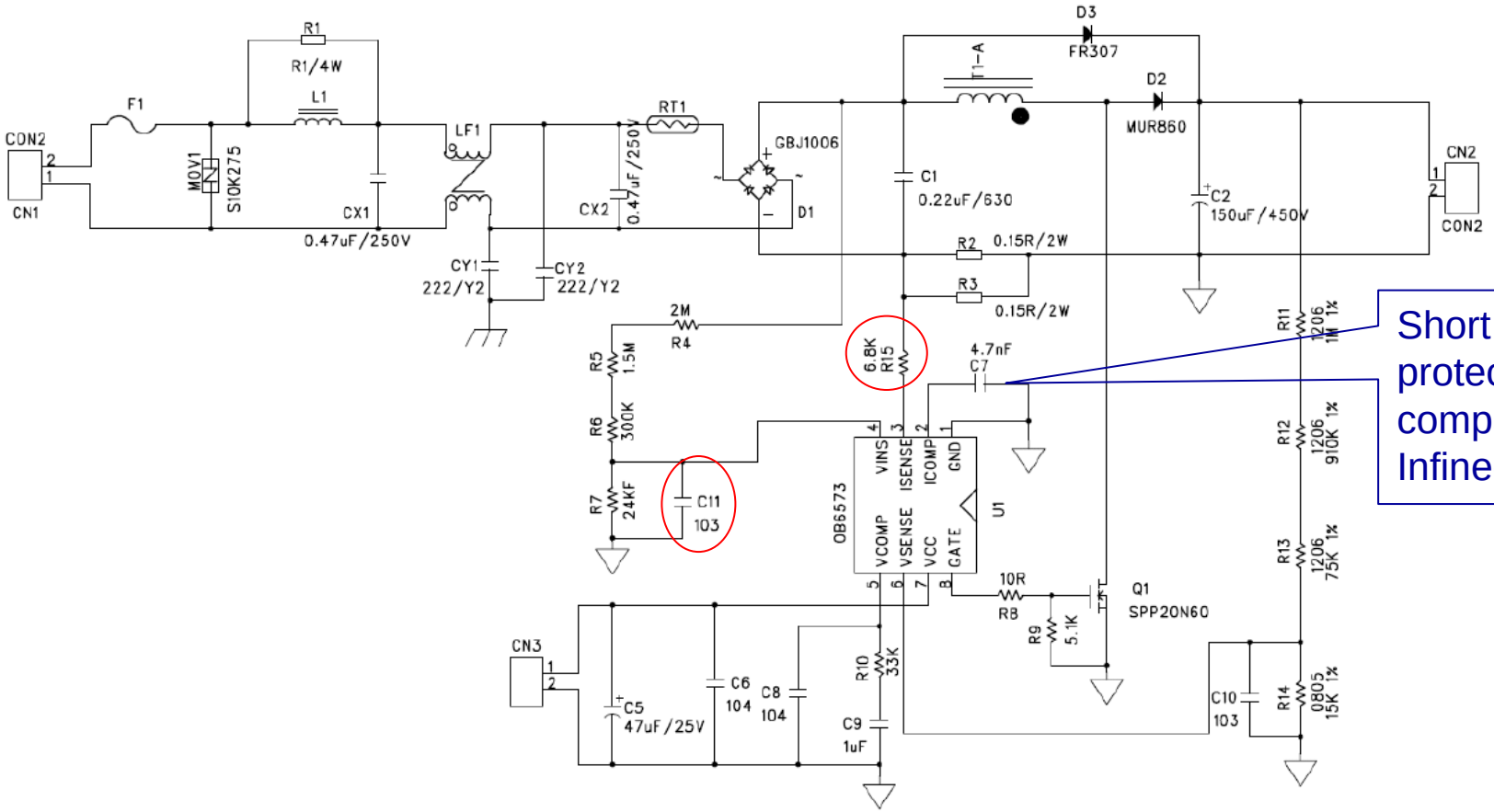






8 Pin CCM PFC Controller -OB6573/6572

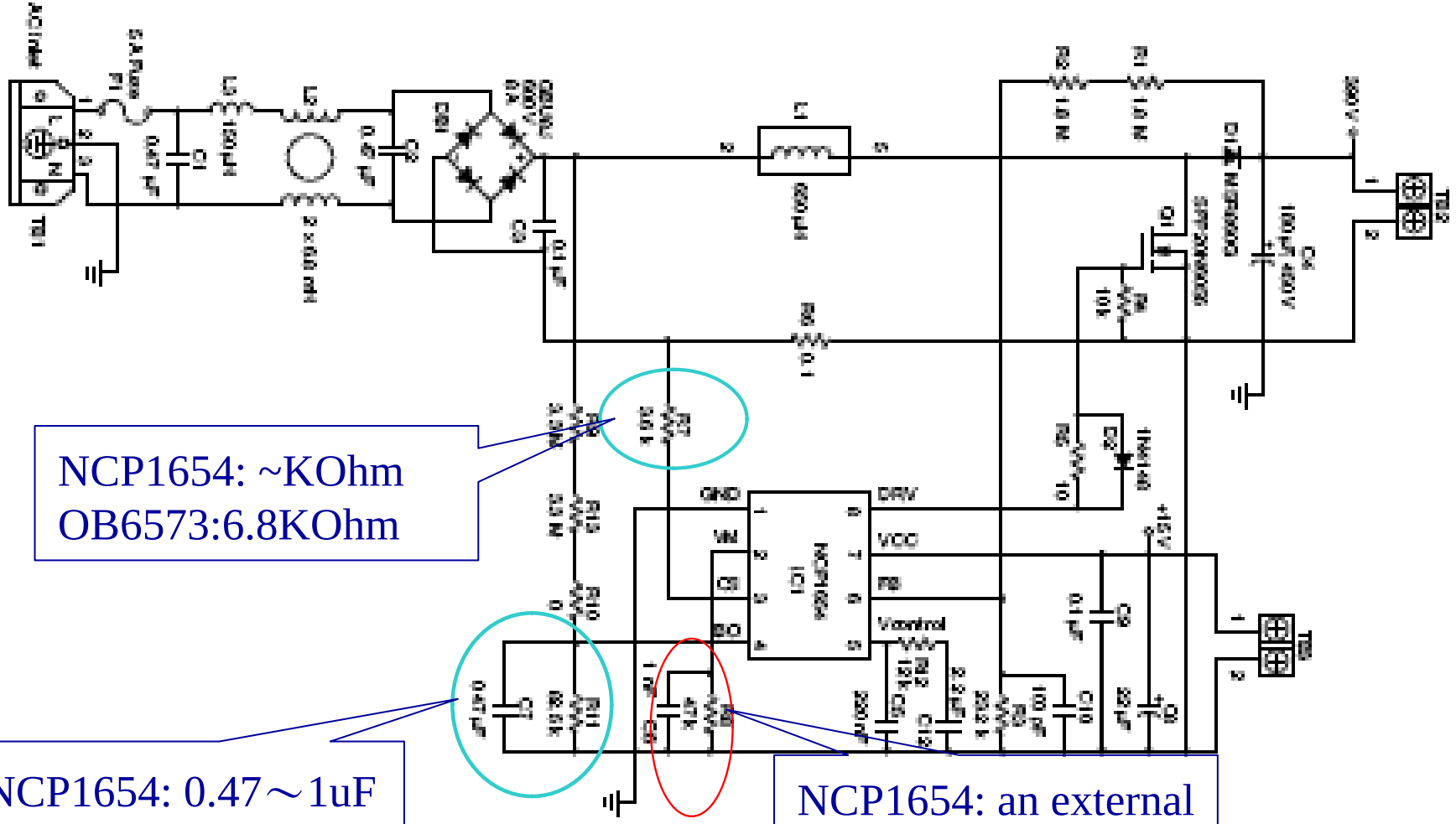
OB6573 300W System Circuit



Short protection compared to Infineon part

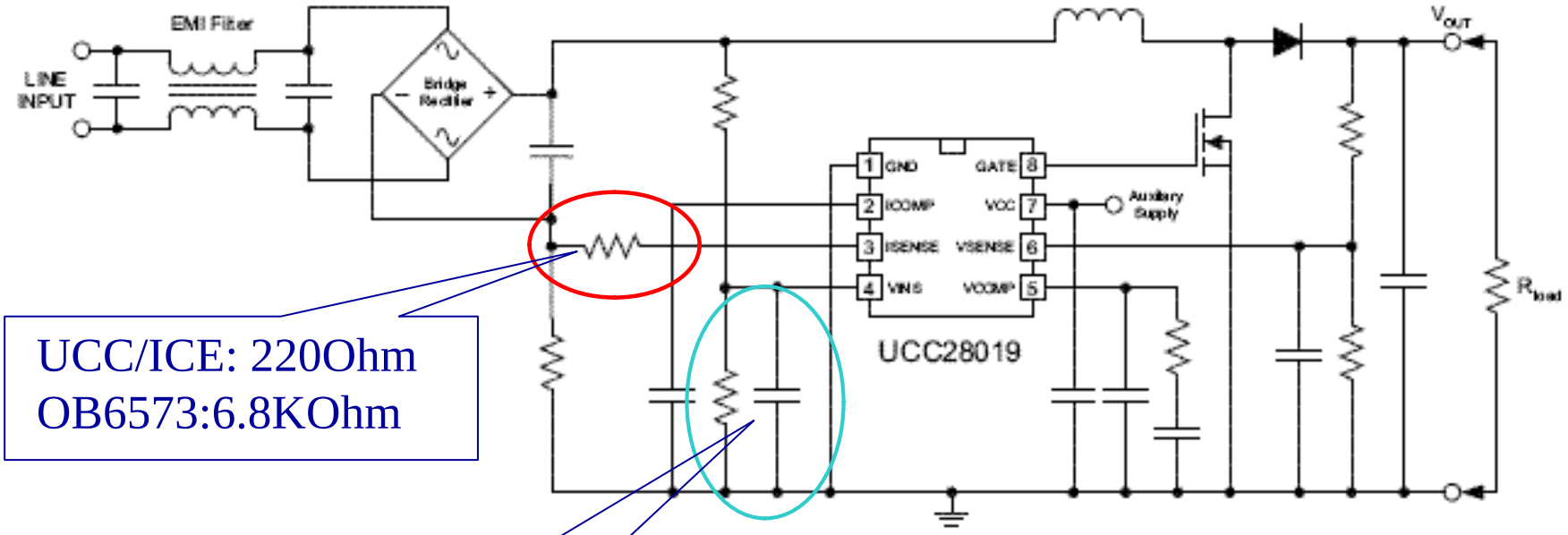
8 Pin CCM PFC Controller -OB6573/6572

Major changes to Replace NCP1654



8 Pin CCM PFC Controller -OB6573/6572

Major changes to Replace UCC28019/ICE2PCS02

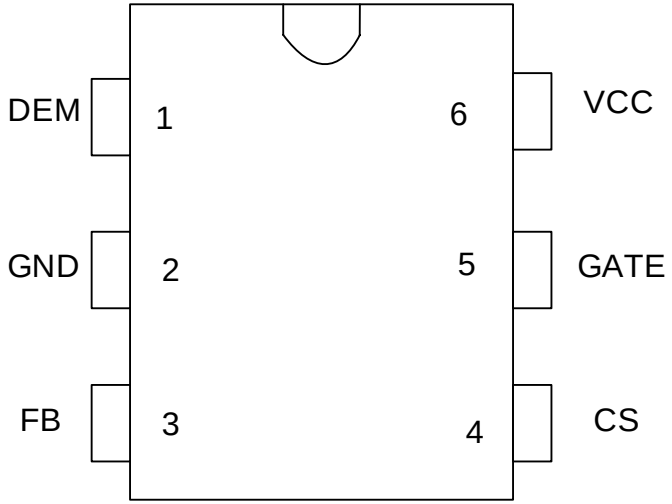


UCC/ICE: 220Ohm
OB6573:6.8KOhm

UCC/ICE: 0.68~1uF
OB6573: 10nF

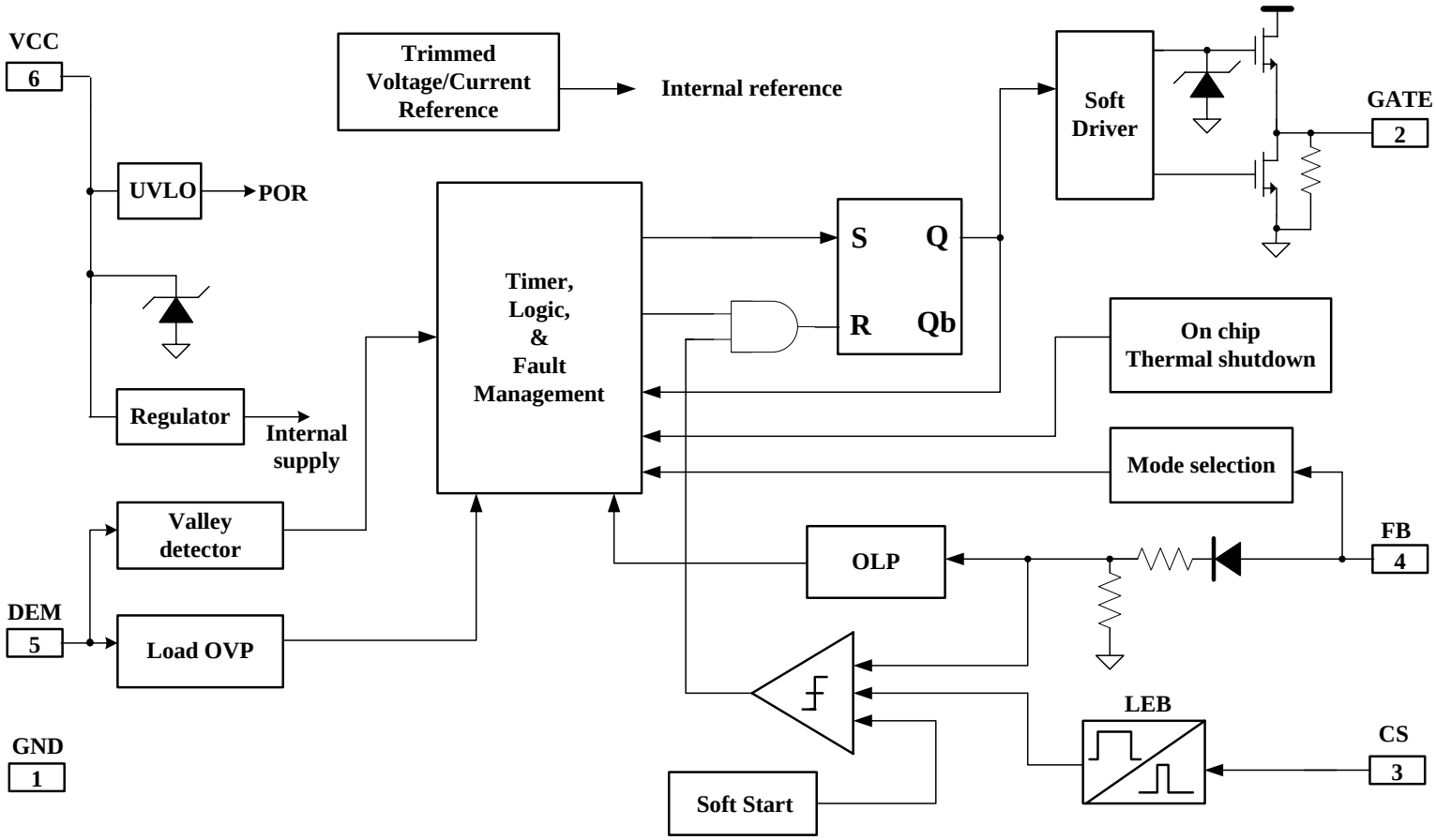
High Efficiency, Adaptive Multi-mode PWM Controller– OB2361

Pin Configuration



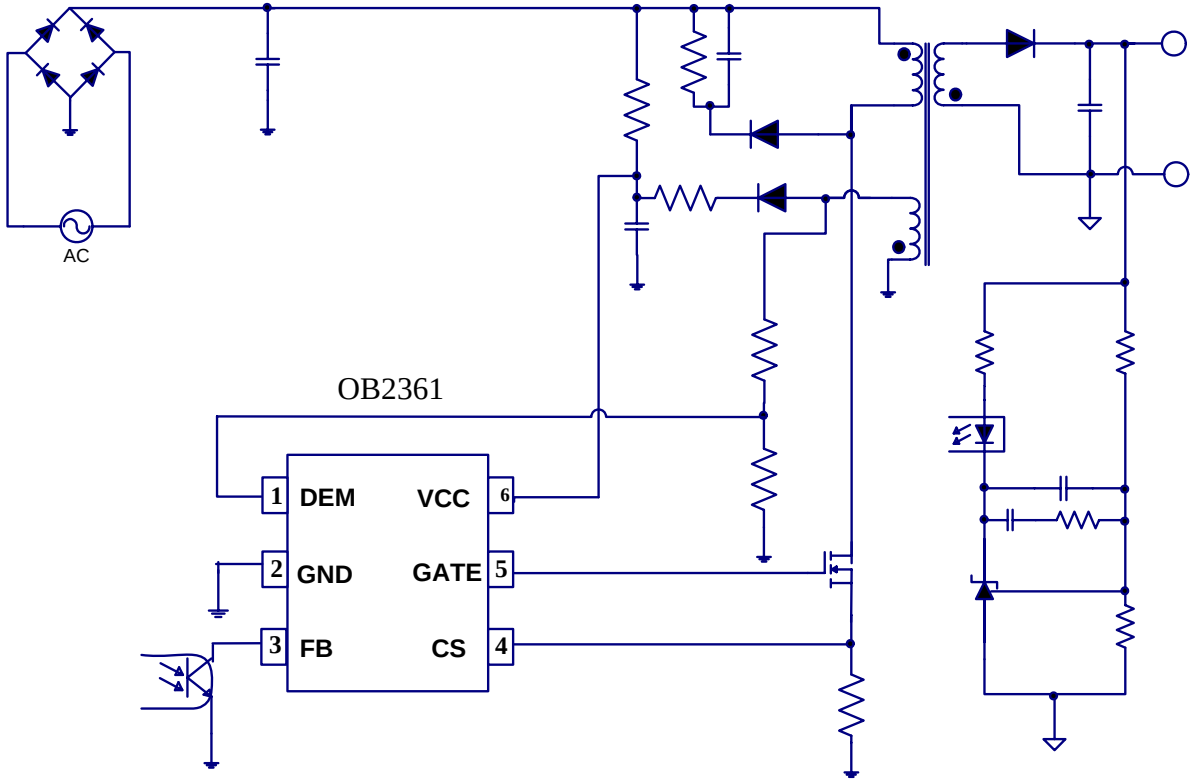
High Efficiency, Adaptive Multi-mode PWM Controller– OB2361

OB2361 Block Diagram



High Efficiency, Adaptive Multi-mode PWM Controller– OB2361

OB2361 Application Diagram



High Efficiency, Adaptive Multi-mode PWM Controller– OB2361

Common Features

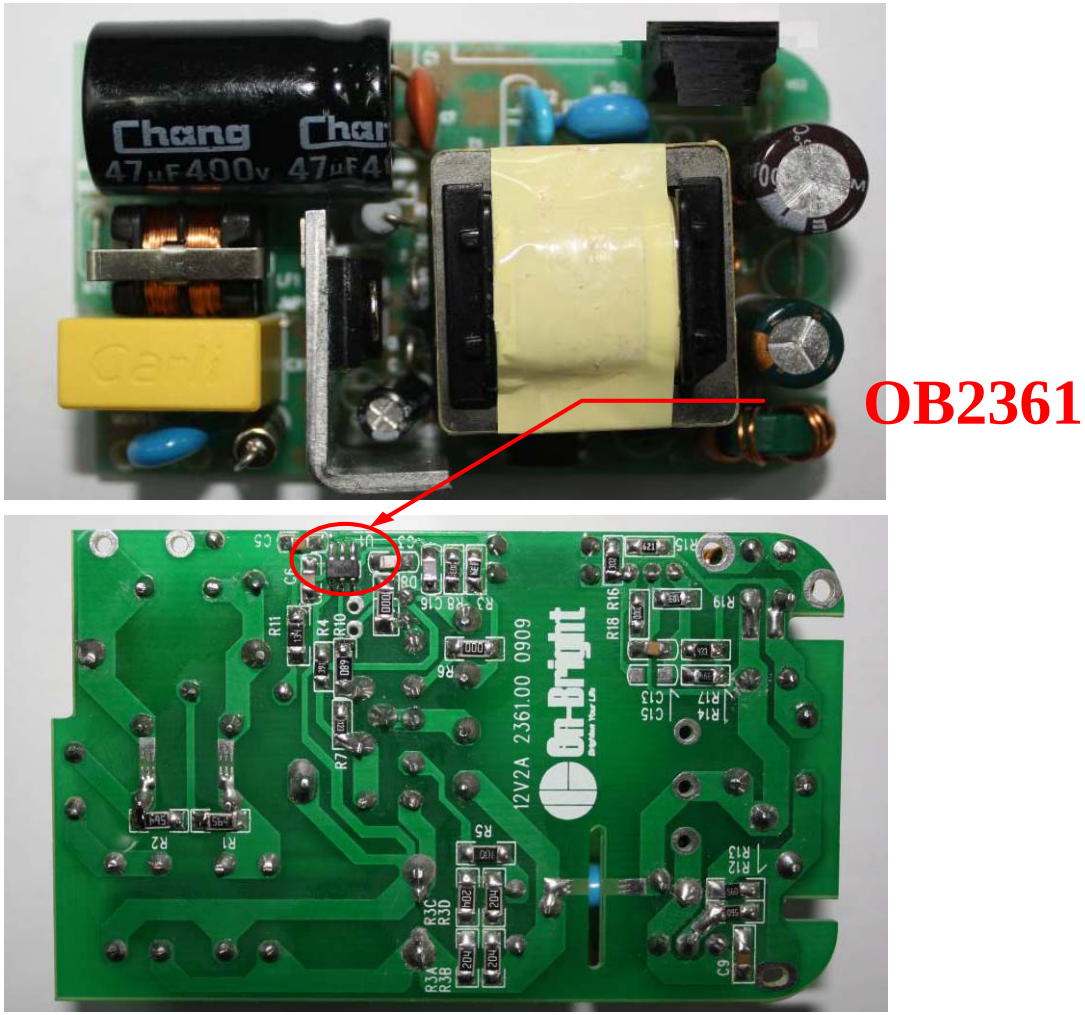
- OB2361 multi mode operation
- Max. 90K and Min. 52K frequency clamping in Multi-mode
- Frequency shuffling for improve EMI performance under CCM operation
- Max. Ton/Max. Toff time limit
- Built-in 4ms soft start
- Built-in OCP compensation and slope compensation
- Precise output OVP, OLP, and I/O short/floating protection

High Efficiency, Adaptive Multi-mode PWM Controller– OB2361

Performance Comparison

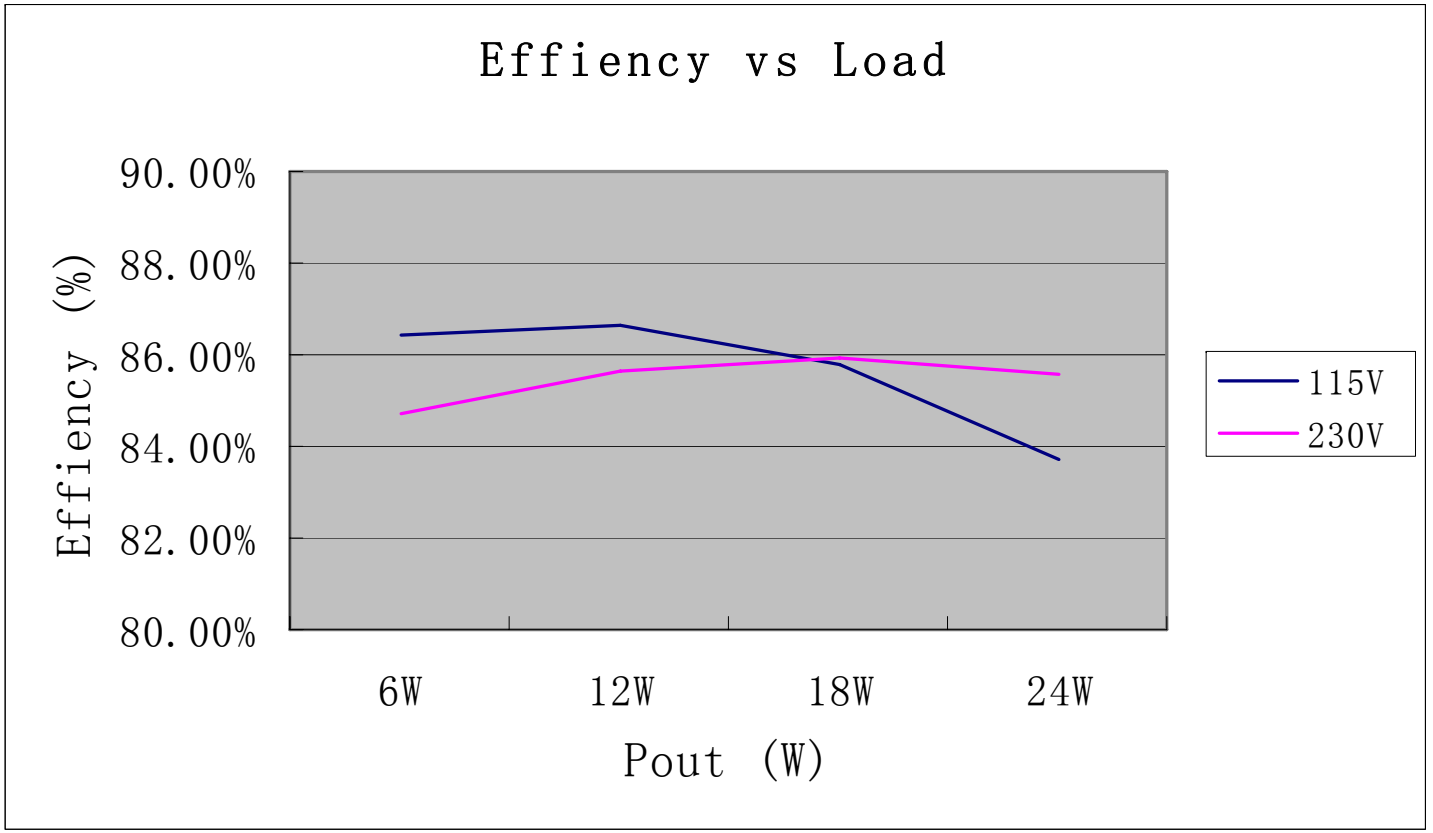
Feature	OB2361	OB2263
Operation mode	CCM/ Valley switching	CCM/ DCM
Frequency	CCM Fixed/ VS Variable	Fixed
Soft Start	Built-in	Built-in
OCP compensation	Y	Y
OVP	Best	Normal
Light-load Efficiency	Best	Normal
Full-load Efficiency	Best	Normal
Transformer Size	Normal	Normal

24W(12V/2A) Demo Board with OB2361



24W(12V/2A) Demo Board with OB2361

Efficiency

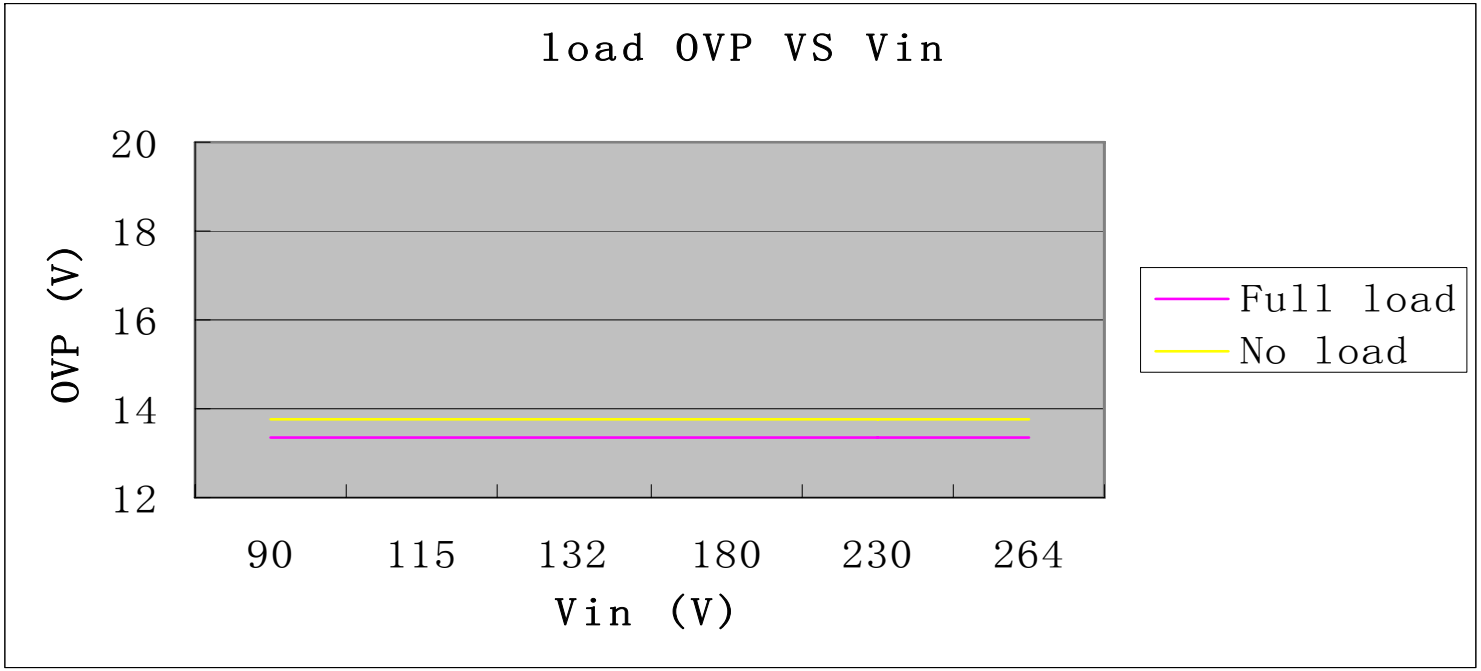


- Average efficiency > **85.1%**

24W(12V/2A) Demo Board with OB2361

3.3 Load OVP Performance

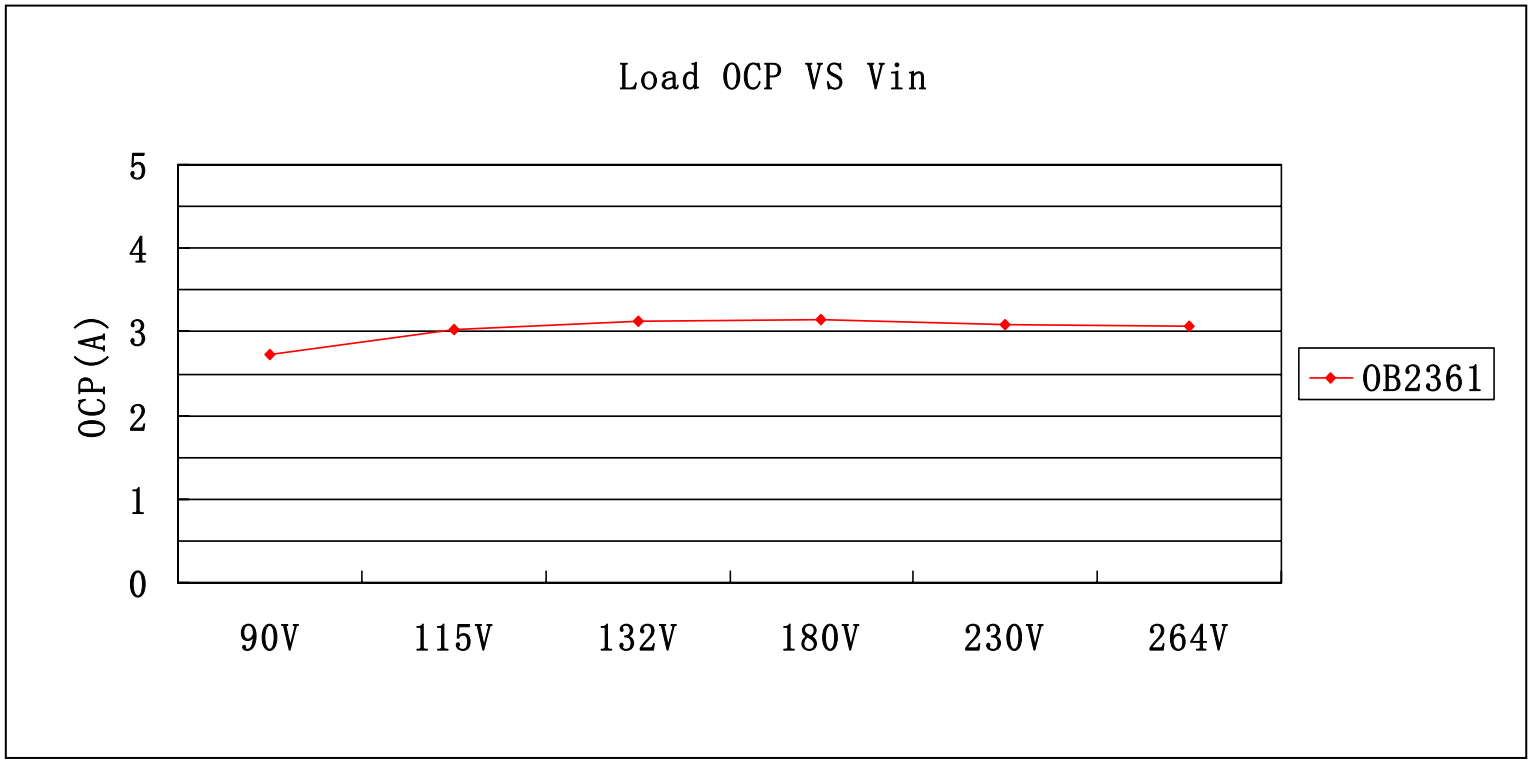
Input voltage	90V/60Hz	115V/60Hz	132V/60Hz	180V/50Hz	230V/50Hz	264V/50Hz
OVP (Full load)	13.33	13.33	13.33	13.35	13.35	13.35
OVP (No load)	13.75	13.75	13.75	13.78	13.78	13.78



24W(12V/2A) Demo Board with OB2361

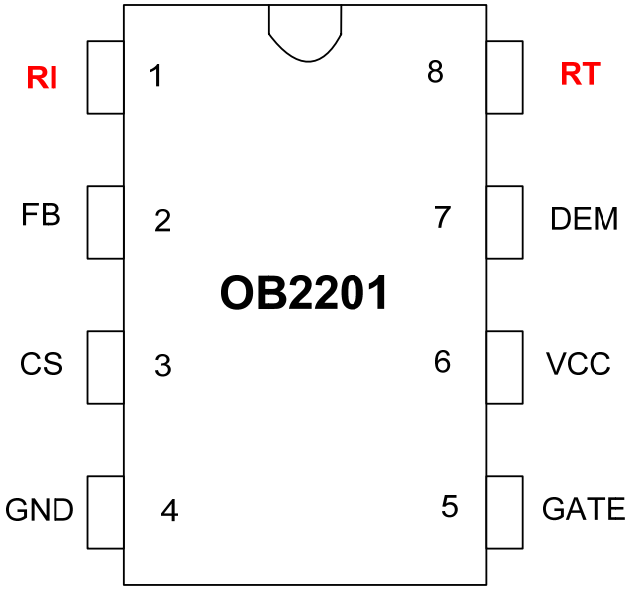
3.4 Load OCP Performance

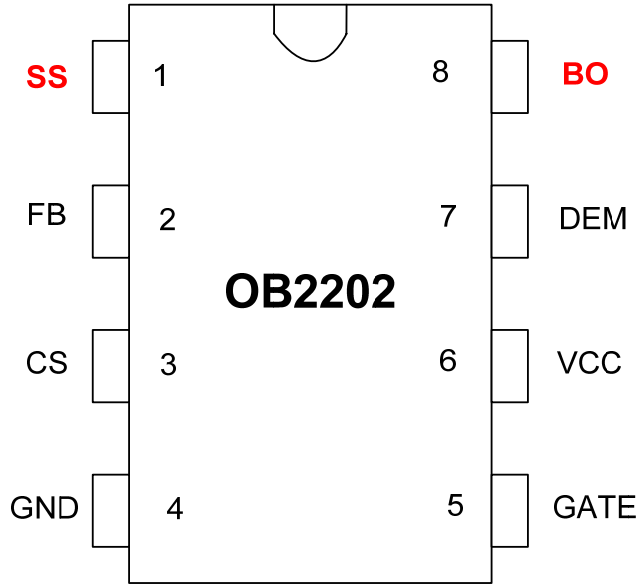
Input voltage	90V/60Hz	115V/60Hz	132V/60Hz	180V/50Hz	230V/50Hz	264V/50Hz
OCP (A)	2.72	3.03	3.12	3.15	3.08	3.07



High Efficiency, Adaptive Multi-mode PWM Controller– OB2201

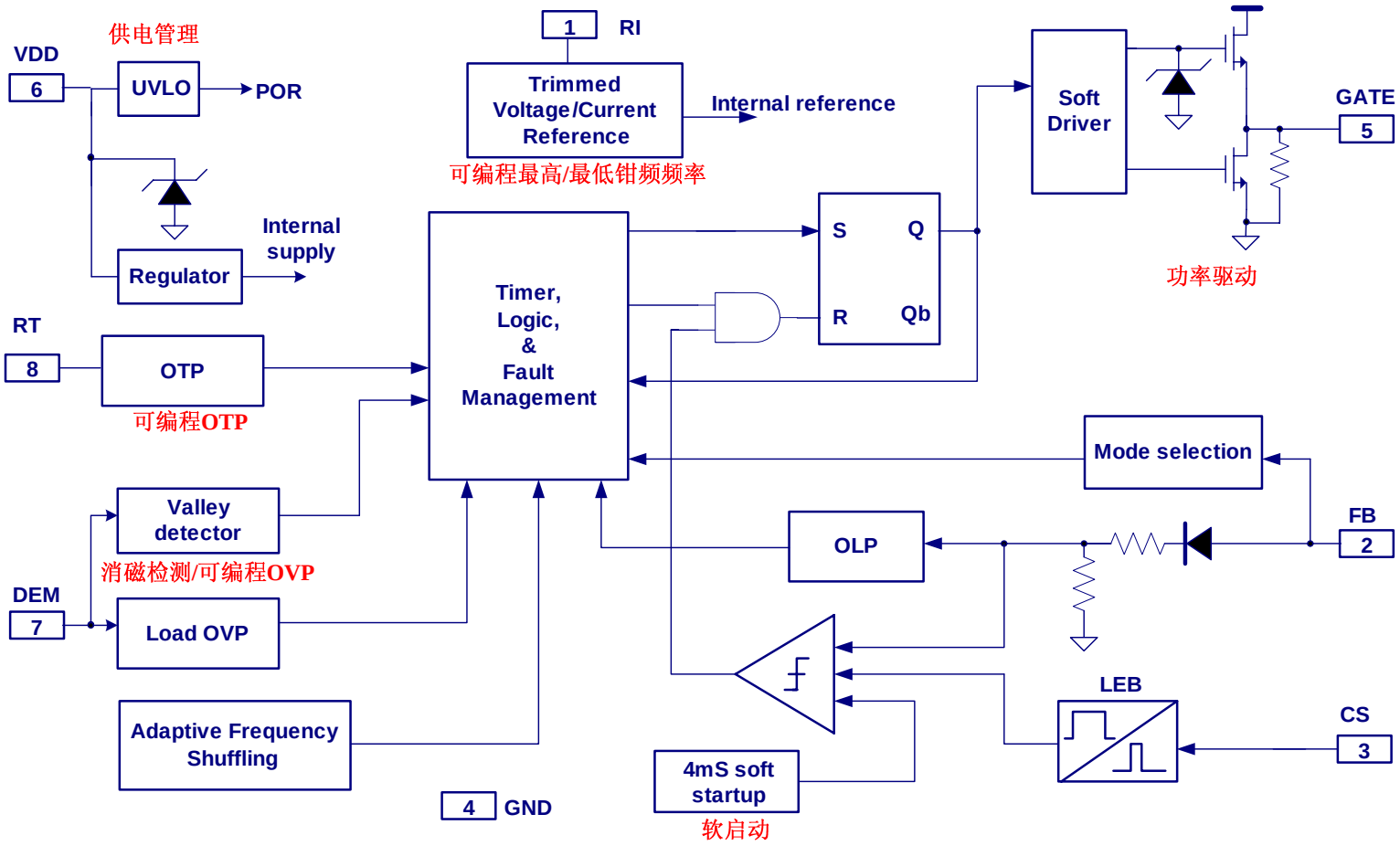
Pin Configuration





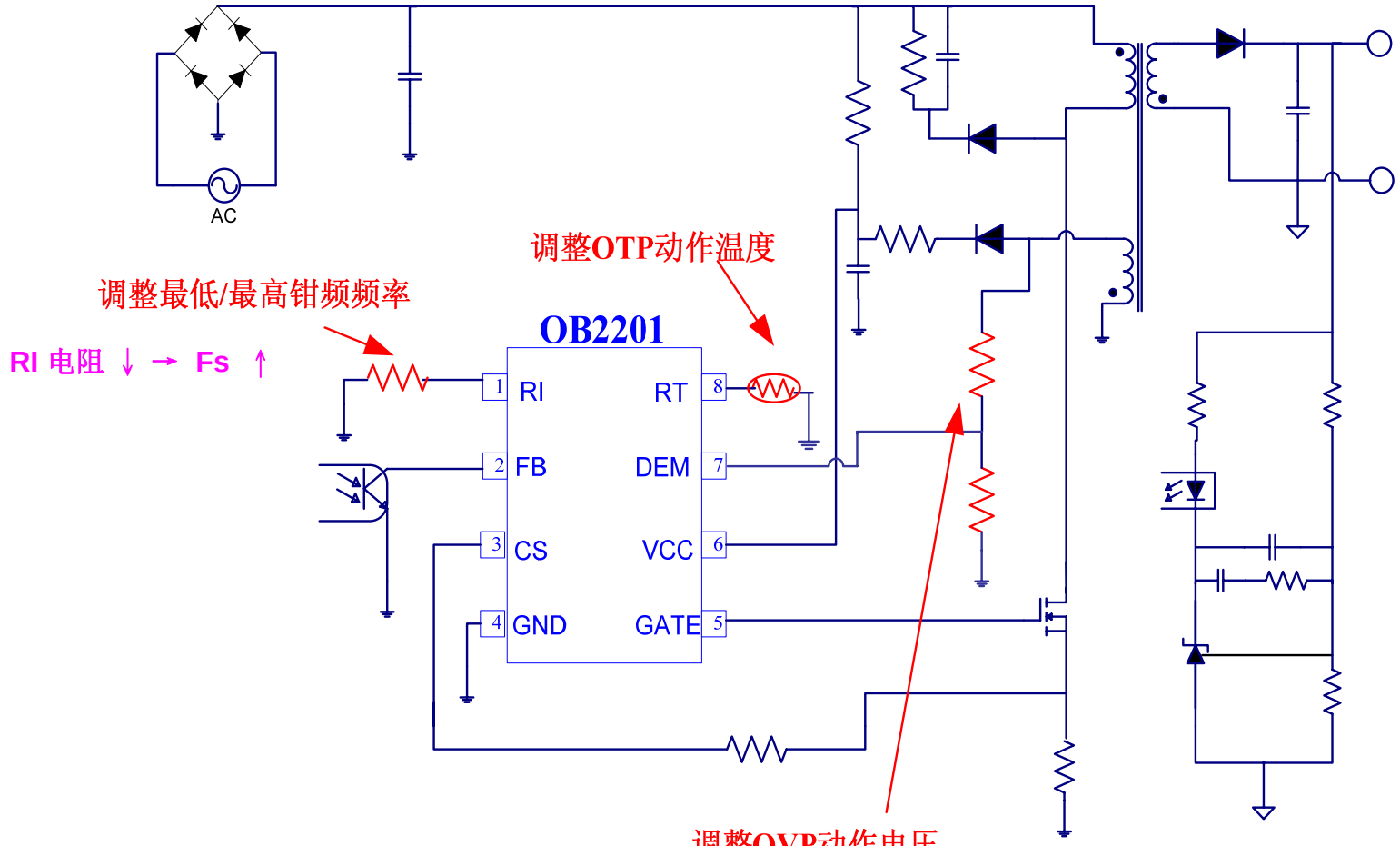
High Efficiency, Adaptive Multi-mode PWM Controller– OB2201

OB2201 Block Diagram



High Efficiency, Adaptive Multi-mode PWM Controller– OB2201

OB2201 Application Diagram



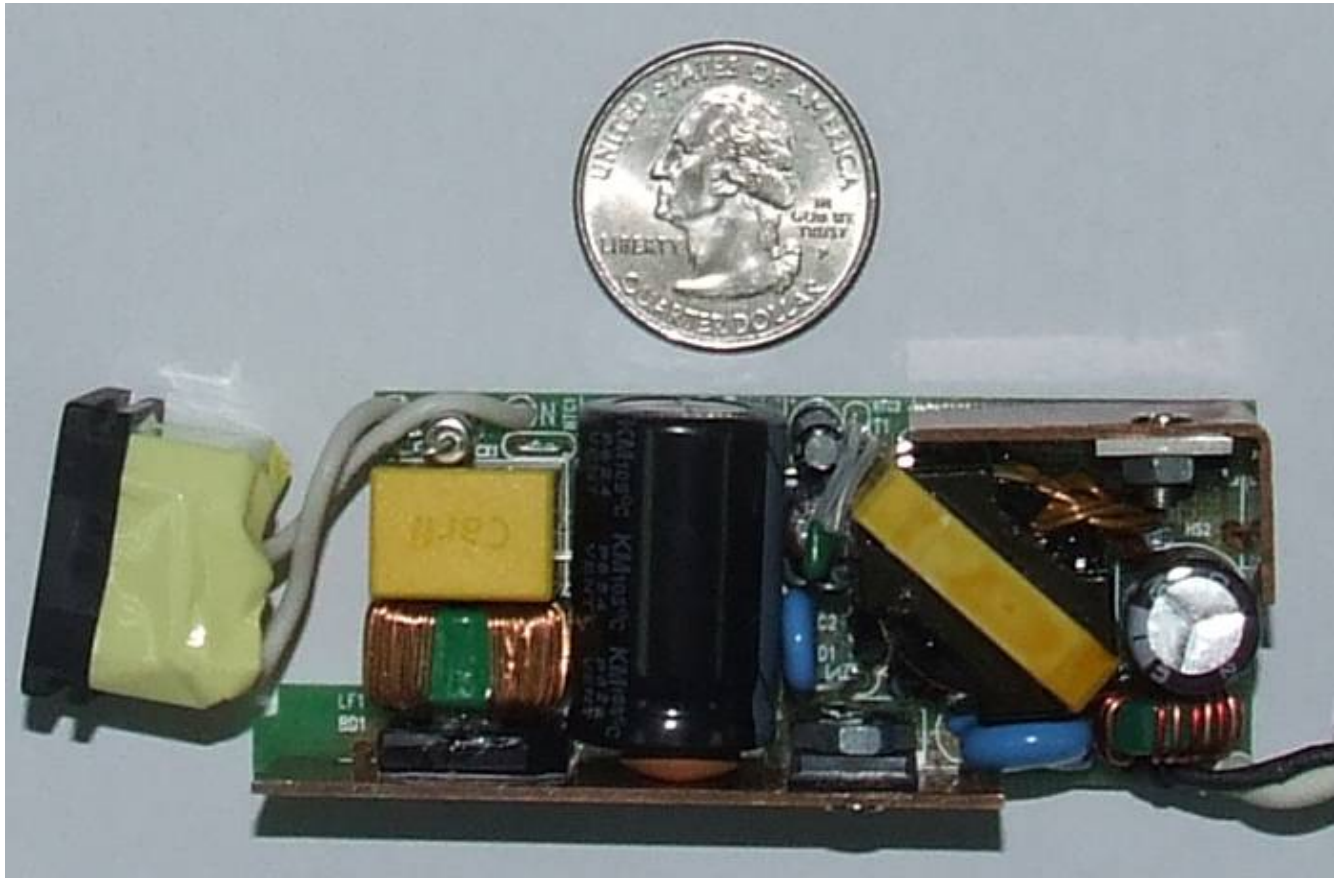
High Efficiency, Adaptive Multi-mode PWM Controller– OB2201

OB2201 Common Features

- Multi-mode operation (CCM-QR)
- Max. 90K and Min. 52K frequency clamping in Multi-mode
- Max. Ton/Max. Toff time limit
- Built-in 4ms soft start
- Built-in OCP compensation and slope compensation
- Programmable Precise Output OVP, OLP, and I/O short/floating protection

High Efficiency, Adaptive Multi-mode PWM Controller– OB2201

36W 12V3A Demo Board With OB2201



High Efficiency, Adaptive Multi-mode PWM Controller– OB2201

OB2201 36W Demo Board Performance

Efficiency Test at End of AWG18 Cable

Vin	Efficiency (%)				Average Eff (%)	EPS2.0 Level 5
	25% Load	50% Load	75% Load	100% Load		
90V/60Hz	85.32	86.52	84.98	83.12	84.98	84.63%
115V/60Hz	85.64	86.99	86.70	84.88	86.05	
132V/60Hz	85.70	86.89	87.03	85.57	86.29	
180V/50Hz	85.69	86.98	87.34	86.82	86.70	
230V/50Hz	85.15	86.68	87.20	86.94	86.49	
264V/50Hz	84.50	86.34	86.83	86.69	86.09	

OVP Protection and Power Saving

Input voltage	90V/60Hz	115V/60Hz	132V/60Hz	180V/50Hz	230V/50Hz	264V/50Hz
OVP (Full load)	15.9	15.9	15.9	15.9	16.1	16.1
OVP (No load)	16.2	16.4	16.4	16.4	16.4	16.4
Standby power	0.101W	0.104W	0.108W	0.122W	0.141W	0.158W

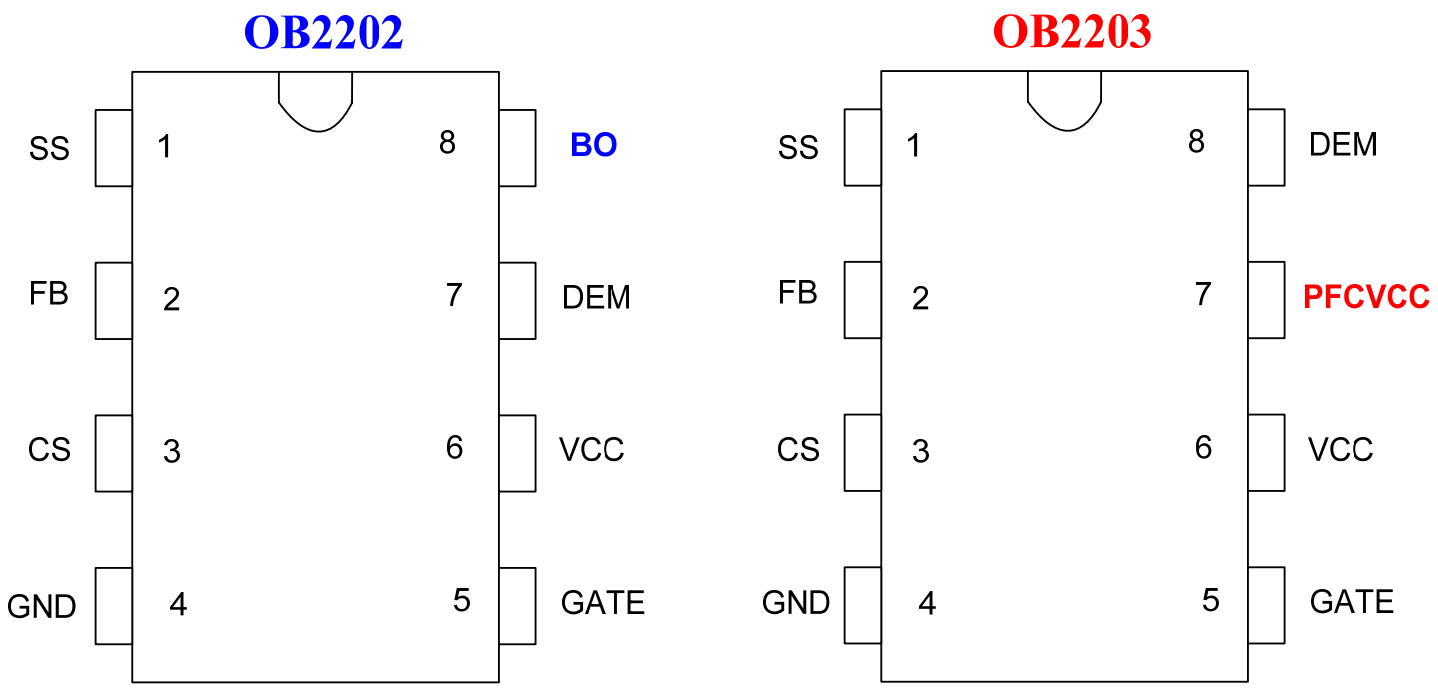
High Efficiency, Adaptive Multi-mode PWM Controller– OB2201

OB2201 36W Demo Board Performance

Light load performance

SPEC			OB2201 36W 12V3A			
Pout	Pin	Efficiency	Vin	Pout	Pin	Efficiency
0.3W	< 1W	30%	115V	1W	0.494W	60.72%
			230V	1W	0.535W	56.07%
1W	< 1.428W	70%	115V	1W	1.314W	76.10%
			230V	1W	1.358W	73.63%
1.5W	< 2.143W	70%	115V	1.5W	1.902W	78.86%
			230V	1.5W	1.944W	77.16%
2W	< 2.857W	70%	115V	2W	2.493W	80.20%
			230V	2W	2.535W	78.88%

High Performance QR PWM Controller – OB2202/OB2203



Used in applications without PFC

Used in applications with PFC

High Performance QR PWM Controller – OB2202/OB2203

- Max. and Min. frequency clamping in QR mode
- Max on time limit
- Programmable soft start
- External latch triggering
- Built-in OCP compensation
- On chip OTP, Precise load OVP, OLP

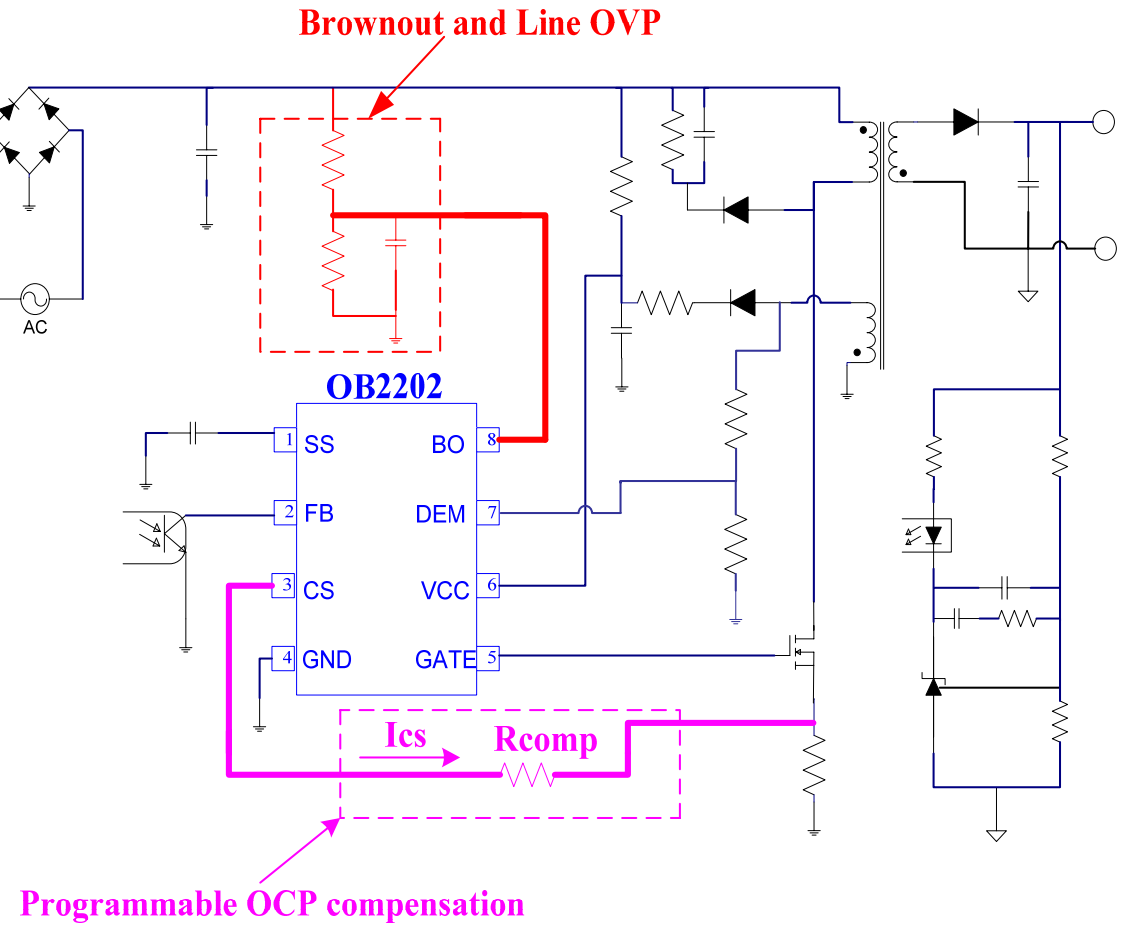
Performance Comparison

Feature	OB2203/ 2202	NCP1337/ 1377	ICE2QS01	UUC28600	TEA1532/ 1533
Multi mode	Y	N	Y	Y	Y
Built-in PFC manager	OB2203 only	N	N	Y	N
PFC switch		N	N	N	N
Frequency foldback	Y	N	Y	Y	Y
Adjustable Soft Start	Y	N	N	Y	Y
Brown out protection	OB2202 only	NXX1337 only	Y	N	Y
OCP compensation	Y	NXX1337 only	Y	Y	N
Min freq. clamp in QR	Y	N	Y	Y	N

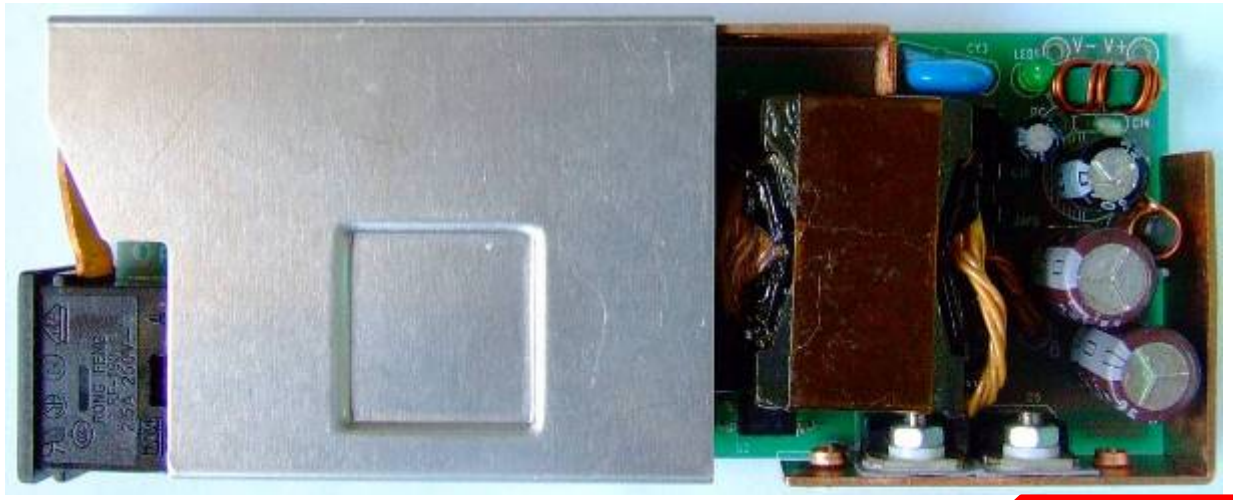
QR Controller Comparison Table (OB2203)					
Feature	**OB2203**	**NCP1377**	**TEA1552/32**	**FA5540/1/2**	**UCC28600**
Driving Current Capability	1A	Source/Sink 500mA	Source 170mA Sink 700mA	Source 0.25A Sink 0.50A	Source 0.75A Sink 1A
Soft Start	Y	Y	Y	Y(1ms)	Y
HV Start	N	Y	Y	Y	N
PFC on/off control	Y	N	N	N	Y
PFC IC control switch	Y	N	N	N	N
Audio Noise Free	Y	Y	N	N	?
Extended Burst Mode	Y	Skip Cycle	Cycle Skip	Burst Switching	Burst Mode
OVP	Y	Y	N	Y	Y
OCP Compensation	Y	N	Y	N	Y
OLP	Y	Y	N	Y	N
OTP	Y	Y	Y	?	Y
VDD clamp	Y	Y	N	Y	Y
Vgate clamp	Y	N	Y(12.5V)	N	Y(13V)
Auto Recovery	Y/N	Y	N	Y	?
Latch Shutdown	Y	Y	Y	?	?
Package	SOP8 DIP8	SOIC-8 SOIC-7 PDIP-7	SO-14/SO-8	SOP8 DIP8	SOIC-8

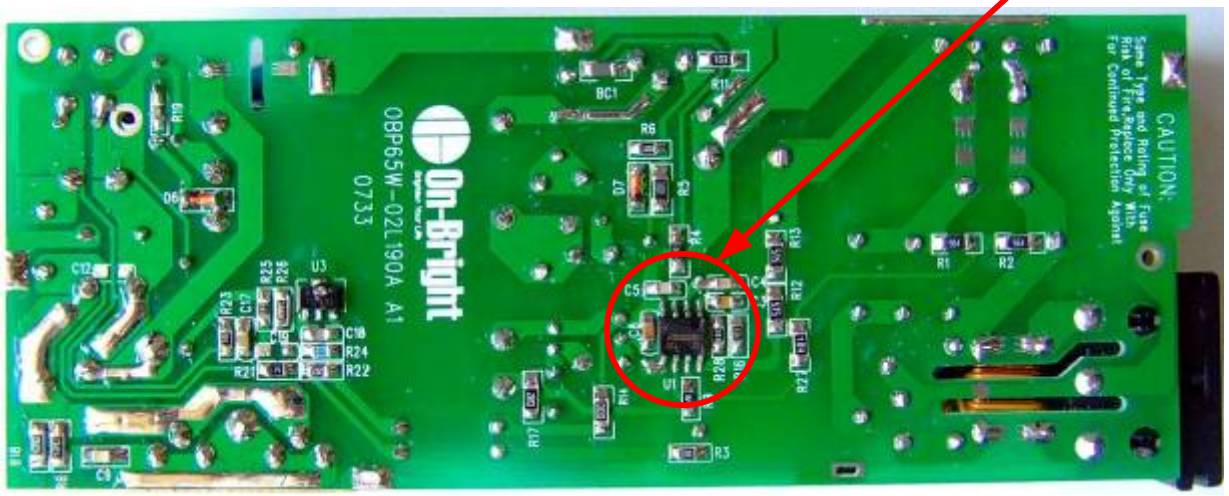
QR Controller Comparison Table (OB2202)					
Feature	OB2202	NCP1207AD (ON-semi)	NCP1337 (ON-semi)	TEA1532 (NXP)	ICE2QS01 (Infineon)
POWER OR Driving Current Capability	60W	500mA	Source 170mA Sink 700mA	Up to 250w(print)	Up to 200W
Multi mode	Y	free running	free running	Y	Y
Frequency foldback	Y	Fosc<100khz	Fosc<100khz Fosc<300khz IN B	Y	N
Soft Start	adj.	1mS	1mS	adj.	24mS
Brown out protection	Y	N	Y	Y	N
OPP compensation	precise<10%	Y	Y	Y	Y
Input OVP	Y(4*brownout)	N	N	N	N
O/P OVP	Y	Y	Y	Y	Y
Cycle by Cycle OCP	Y	Y	Y	Y	Y
OLP	Y	Y	Y	Y	Y
OTP	140℃	155℃(latch)	150℃	140℃latch	N
VDD clamp(OVP)	31V	N	N	N	Y
Vgate clamp	15V	N	N	N	10V
Auto Recovery	Y	Y	Y	adj.with CTRL pin voltage level	Y
Latch Shutdown	adj.with SS pin voltage level	OTP	adj.with DMG pin voltage level		Output OVP, short winding protection
Package	SOP-8 DIP-8	SOP-8 DIP-8	SOP-7,SOP-8, DIP-7	SOT96-1 SOT97-1	PG-DIP-8

OB2202 Application Diagram



65W(19V/3.5A) Demo Board with OB2202

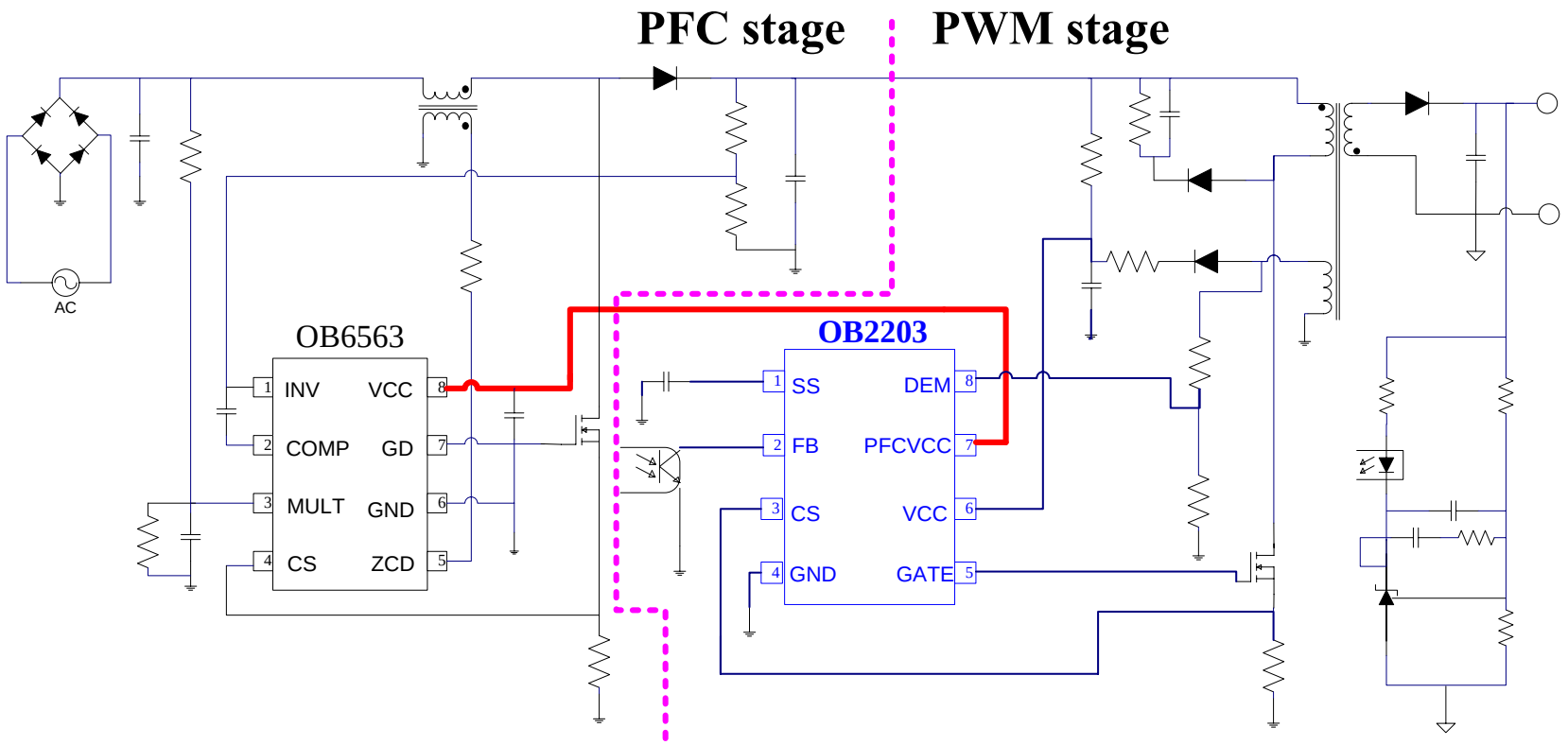




65W(19V/3.5A) Demo Board with OB2202

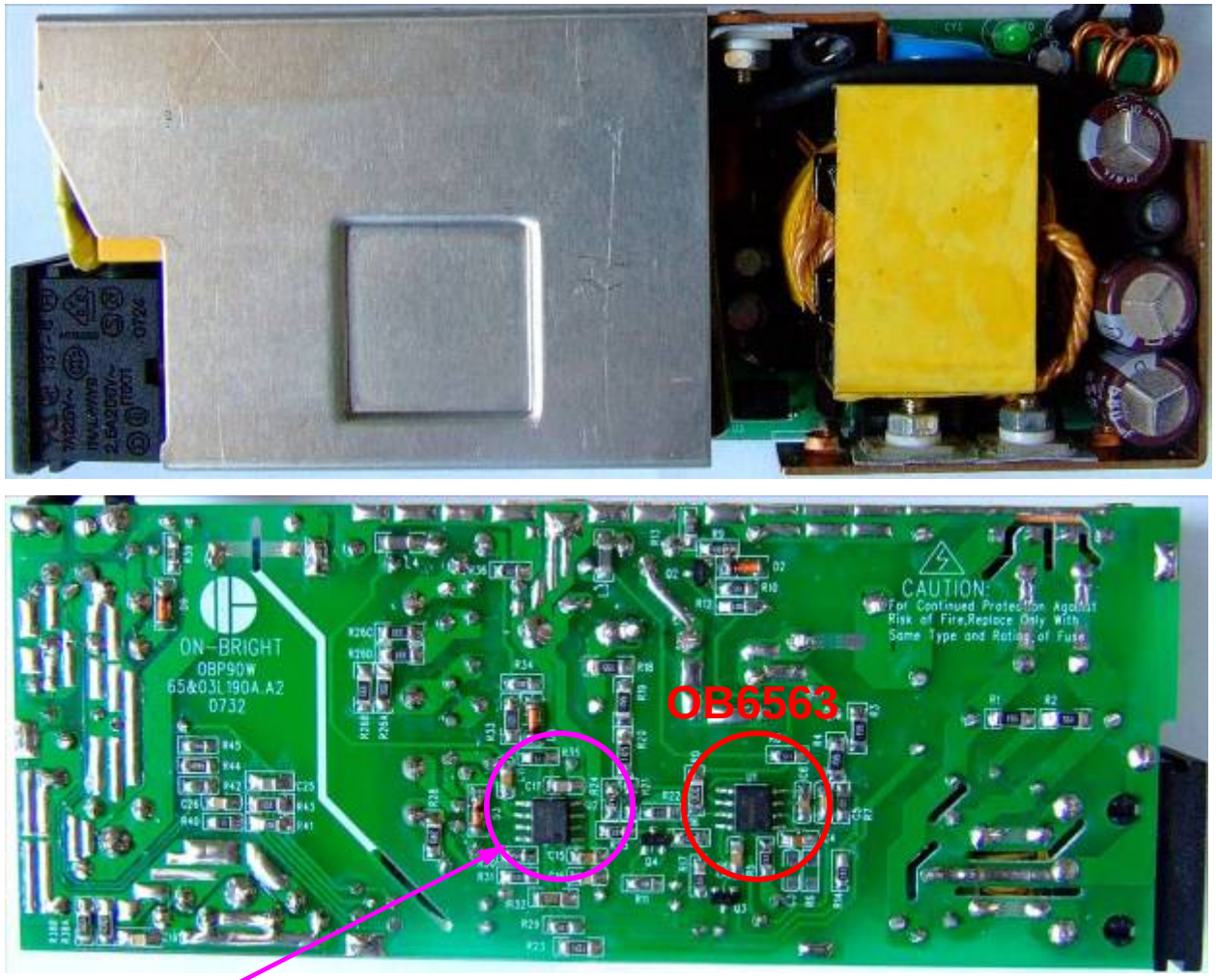
- Low standby (**0.24W** @ 264VAC, with output LED)
- High efficiency [>**90%** @260VAC]
- Precise load OVP (∆ Vovp/Vovp<**5%**)
- Excellent OCP performance (∆ Iocp/Iocp<**10%**)

OB2203 Application Diagram



- Direct connection to PFC controller → Low system cost
- Ultra low standby (**<0.3W**) for 75W+ solution with PFC

90W(19V/4.73A) Demo Board with OB2203



90W(19V/4.73A) Demo Board with OB2203

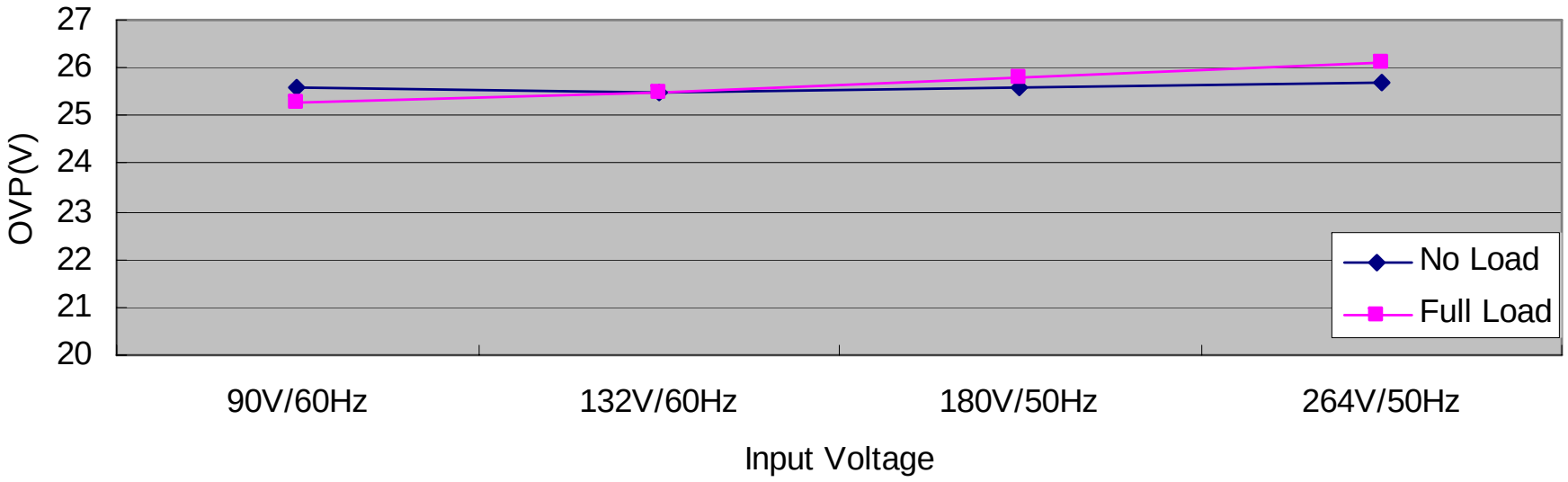
- Ultra low standby (**0.28W** @ 264VAC, with output LED)
- Avg. efficiency = **88.28%** @ 90-260VAC and full load
- PFC is shutdown @ light loading and fault condition
- PF = **0.984** @ 220VAC and full loading
- Precise load OVP (Δ Vovp/Vovp<**5%**)

Meets EPS2.0 Regulation

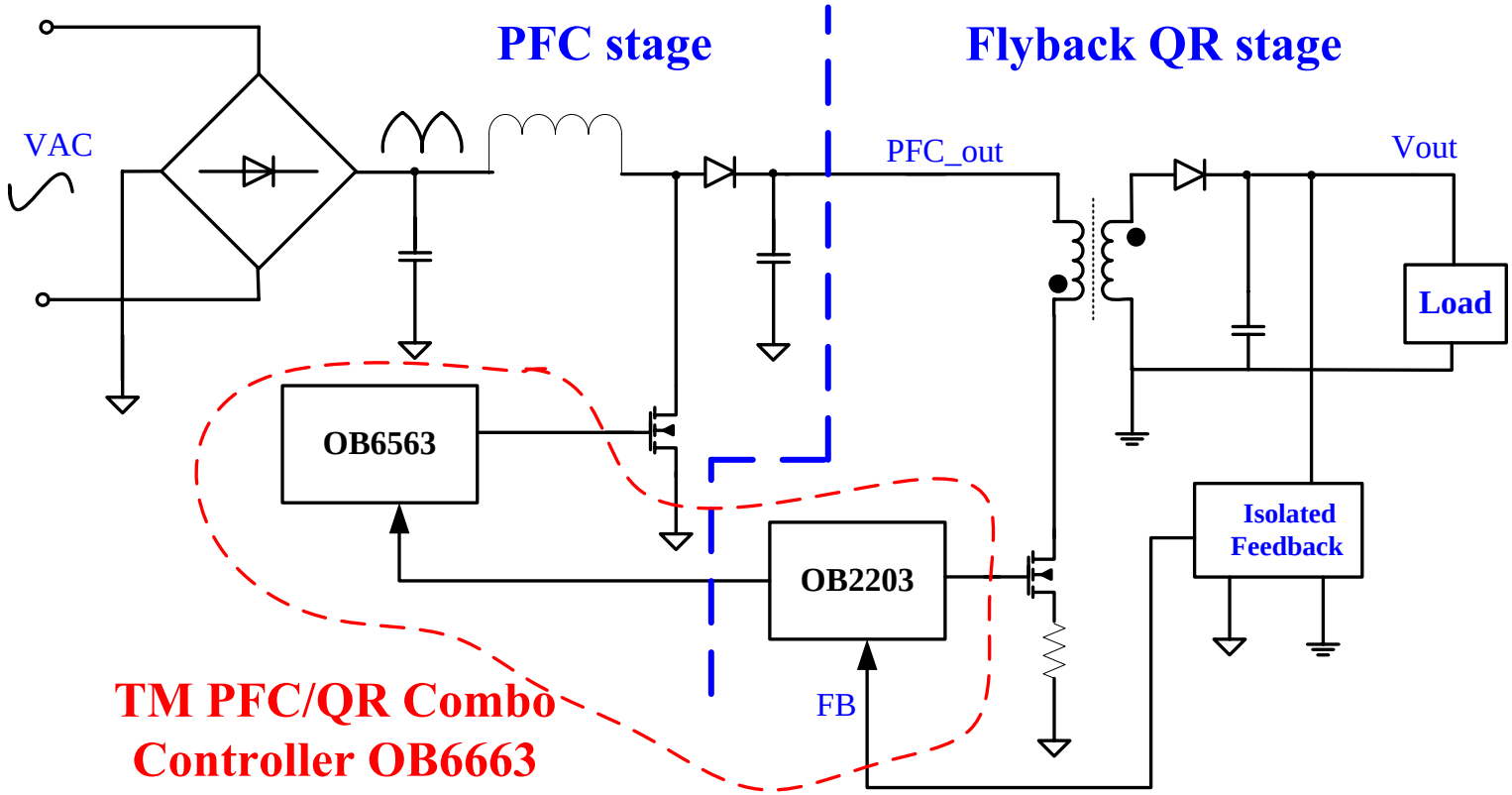
Input Voltage	Efficiency (25% load)	Efficiency (50% load)	Efficiency (75% load)	Efficiency (100% load)	Average Efficiency
115VAC/60HZ	88.36%	89.59%	89.48%	88.41%	88.96%
230VAC/50HZ	88.17%	89.18%	89.81%	90.09%	89.31%
EPS2.0					>87%

Precise Output OVP Control

Input Voltage	Output OVP Protection Trip Point (V)	
	No-load	Full-load
90V/60Hz	25.6	25.3
132V/60Hz	25.5	25.5
180V/50Hz	25.6	25.8
264V/50Hz	25.7	26.1



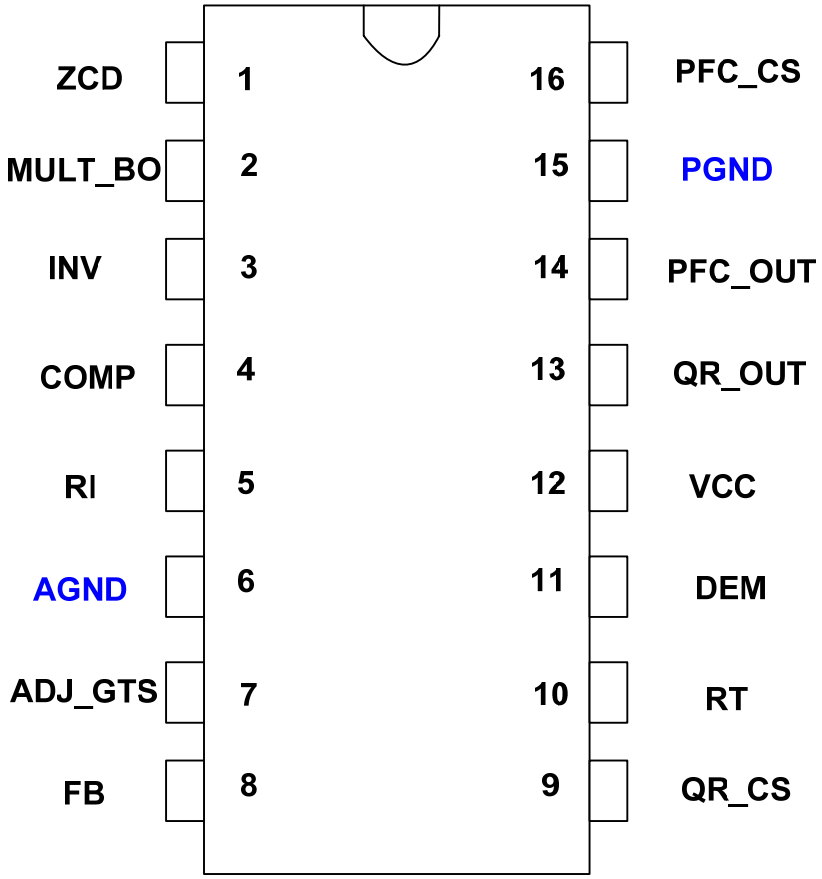
Combo Controller vs. Separate Controllers



- PFC/QR Combo → Higher integration with More protections
- PFC/QR Combo → Smaller PCB size with Lower SMD components

High Performance TM PFC/QR Combo Controller OB6663

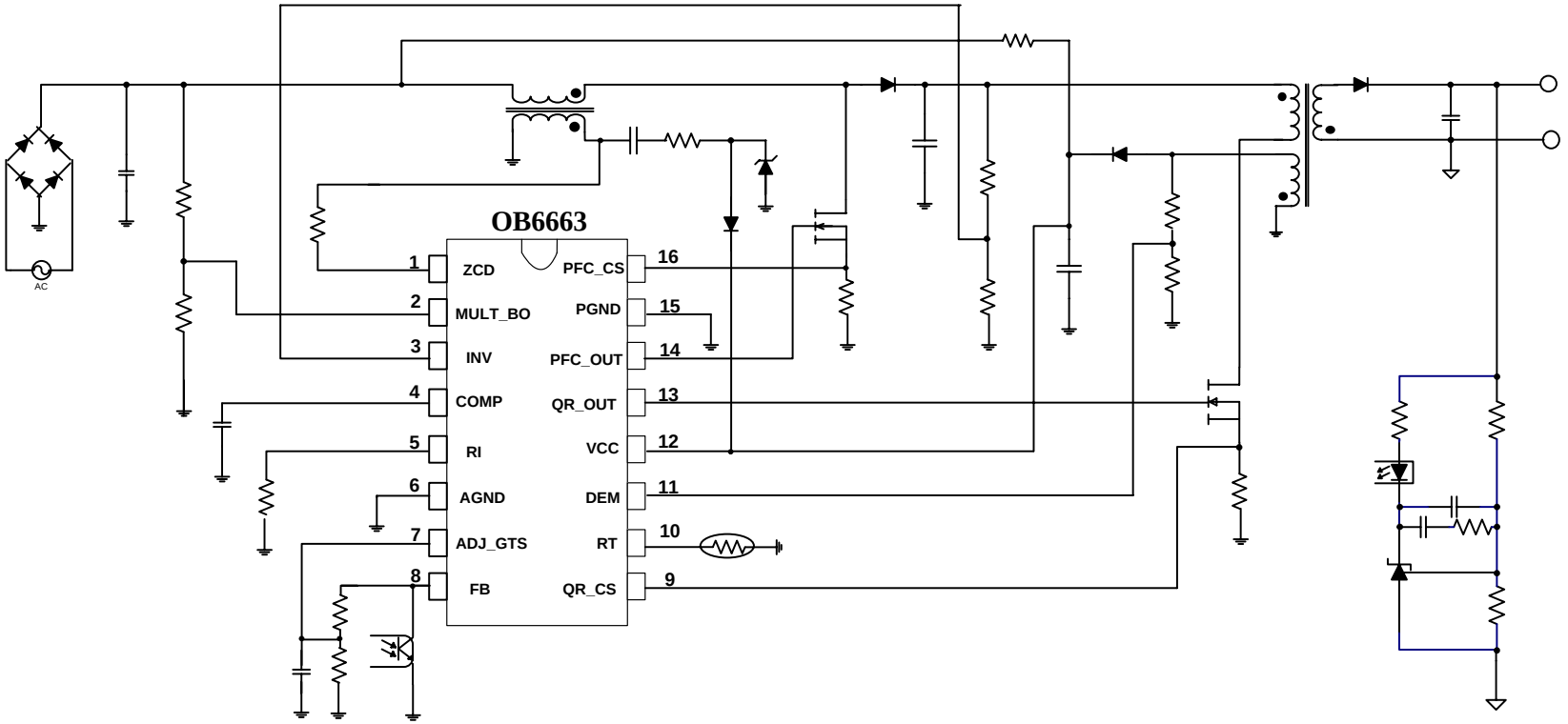
OB6663 Pin Configuration



Separate PGND and AGND for better noise immunity

High Performance TM PFC/QR Combo Controller OB6663

OB6663 Application Diagram



On-Bright's OB6663 vs. NXP's TEA1750

Special features (compared to TEA1750):

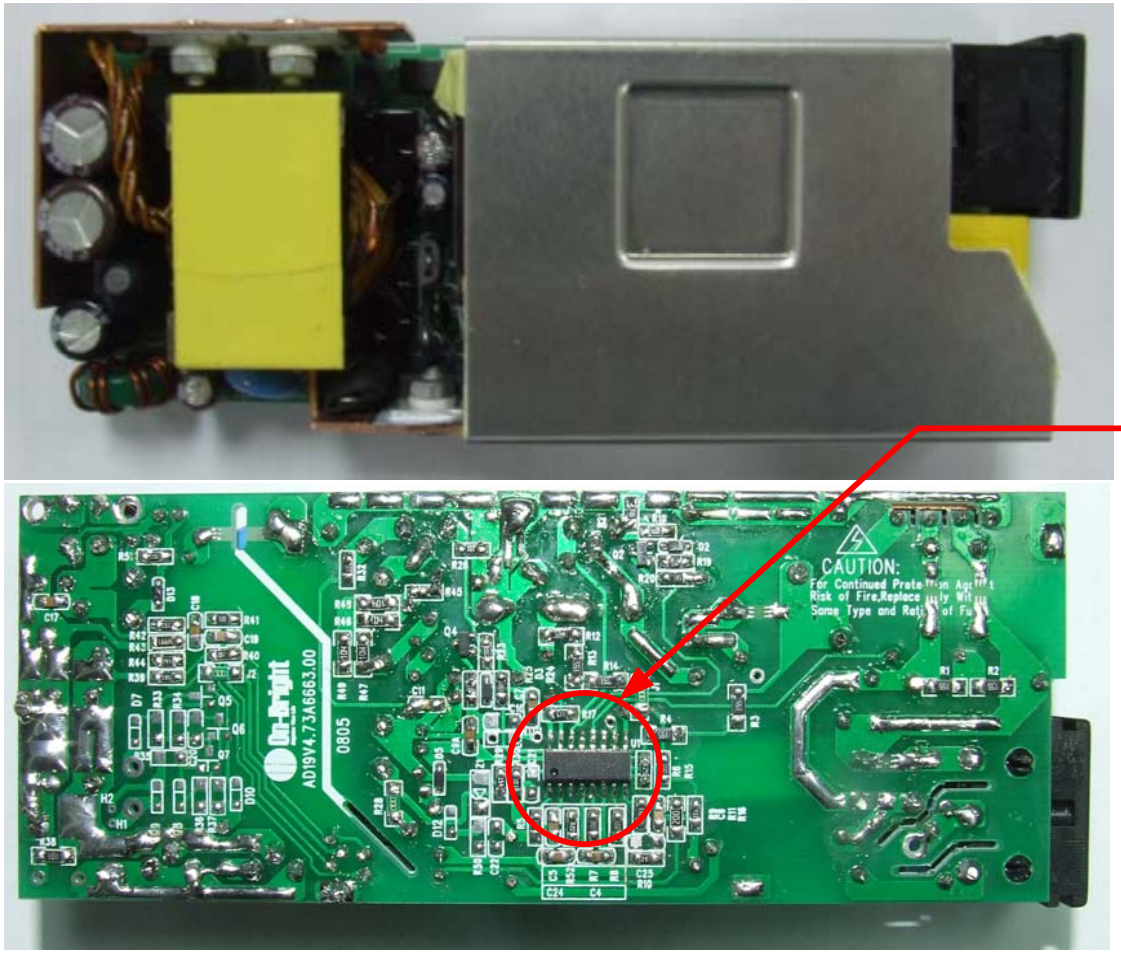
- Built-in dual output PFC control → Lower system cost
- Proprietary startup sequence control → Small PFC output bulk capacitor
- Adjustable PFC Go-to-Standby power level →Ease efficiency optimization
- True QR short circuit protection → Lower short circuit power consumption
- VCC is supplied by both winding →Ease winding design
- Separate PGND and AGND and PFC/QR interference cancellation logic → better noise immunity
- Multiplier based TM PFC →Lower THD and Higher PF
- RT Pin with OTP → For notebook adaptor application
- Multi mode operation for PFC and QR → Optimized efficiency

Comparison between OB6663 & TEA1750		
Features	**OB6663**	**TEA1750(NXP)**
TM PFC/QR combo	Y	Y
Built in dual output control for PFC	Y	N
Adjustable PFC go-to-standby power level	Y	N
VCC supply	by PFC and QR windings	by QR winding
Separate AGND and PGND for better noise immunity	Y	N
Built-in PFC/QR Noise Interference cancellation Logic eases PCB design	Y	N
TM PFC architecture	Multiplier based	Control on time based
THD performance @ 264VAC	Good	Poor
Power Factor (PF) @ 264VAC	Good	Poor
OTP implementation	External RT pin	On chip
High voltage startup	N	Y
< 1 sec startup time @ 90VAC	Y	Y
PFC shutdown @ light loadings	in high line input range	PFC is not shutdown
PFC burst mode	in low line input range	in universal input range
QR soft start	fixed 4ms	programmable
PFC loop feedforward compensation	Y	Y
Auto Recovery	adj.with RT pin voltage level	adj.with Latch pin voltage level
Latch Shutdown		
Package	SOP-16 DIP-16	SOP-16

OB6663's Other Features and Protections

- Built-in PFC loop feedforward compensation
- Quick startup and fast dynamic response for PFC stage
- Precise output over voltage protection (OVP) for both converters
- Built-in soft start for QR stage
- External latch triggering for both converters
- Open loop protection for both converters (OLP)
- Programmable brownout protection (BOP)
- Built-in constant power limiting for QR stage (OPP)
- Cycle-by-cycle (CBC) current limiting for both converters
- 130KHz max frequency clamping for both converters
- Audio free operation

OB6663 90W (19V/4.73A) Demo Board Snapshot



OB6663 90W (19V/4.73A) Adaptor Efficiency and Standby

Efficiency (Cable end, cable resistor=0.07Ohm)

Input voltage	25%	50%	75%	100%	Aver. Eff.	Spec.
115Vac/60Hz	88.11	88.90	88.44	87.80	88.30	>87%
230Vac/50Hz	87.94	89.30	89.40	88.50	88.78	
Input voltage	100%	75%	50%	25%	Aver. Eff.	Spec.
115Vac/60Hz	87.80	88.50	88.12	88.15	88.14	>87%
230Vac/50Hz	88.50	88.10	89.14	87.97	88.43	
Notes: Test method 25%→100% load and 100% load→25% load (test after 15minutes)						

Standby (with LED)

Input Voltage	90V/60Hz	115V/60Hz	132V/60Hz	180V/50Hz	220V/50Hz	264V/50Hz
Pin (W)	0.135	0.165	0.182	0.220	0.276	0.290

Thank You!