Design Concept Report

204W AC-DC Resonant Power Supply

Design Specs	Value	Unit
Input Voltage	198-264	VAC
Input Frequency	47-63	Hz
Output Voltage	12	VDC
Output Current	17	A
Isolation	Yes	
MPS IC	HR1000A, MP6922DS	
Application	Gaming Console Power Supply AC-DC Power Supply	

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Author	Application Engineering Department
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Design Summary

HR1000A + MP6922(A) is a design concept for an offline isolated power supply with 12V, 17A output. It contains the estimated specification of the power supply, a detailed circuit diagram, drawing of the power inductors and transformers. Such information would be useful to the customer to create a similar design with less effort.

There is no physical PCB that can be ordered for MPS's design concepts, however schematics and further support is available upon request. For ordering reference designs that include an assembled PCB and more detailed spec, please refer to MPS website for more information.

DESCRIPTION

Here introduces a design concept for a 204W AC-DC power supply, it is primary for gaming console applications but also applies to other general AC-DC applications.

This design concept utilizes MPS's state-of-art half bridge LLC resonant controller and dual fast synchronous rectifier to realize very high overall efficiency.

HR1000A is a controller designed specifically for the resonant half-bridge ZVS. It controls the output power by changing the switching frequency and controlling the half-bridge with a constant 50% duty cycle. And HR1000A can optimize the light load consumption for the burst mode operation.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input AC Voltage	V_{AC}	198 to 264	VAC
Input Frequency	F	47 to 63	Hz
Output Voltage	V_{OUT}	12	VDC
Output Current	I_{OUT}	17	A
Power Factor*	PF	>0.9	
THD*		<20%	
Active Mode Efficiency*	Eff	>90%	

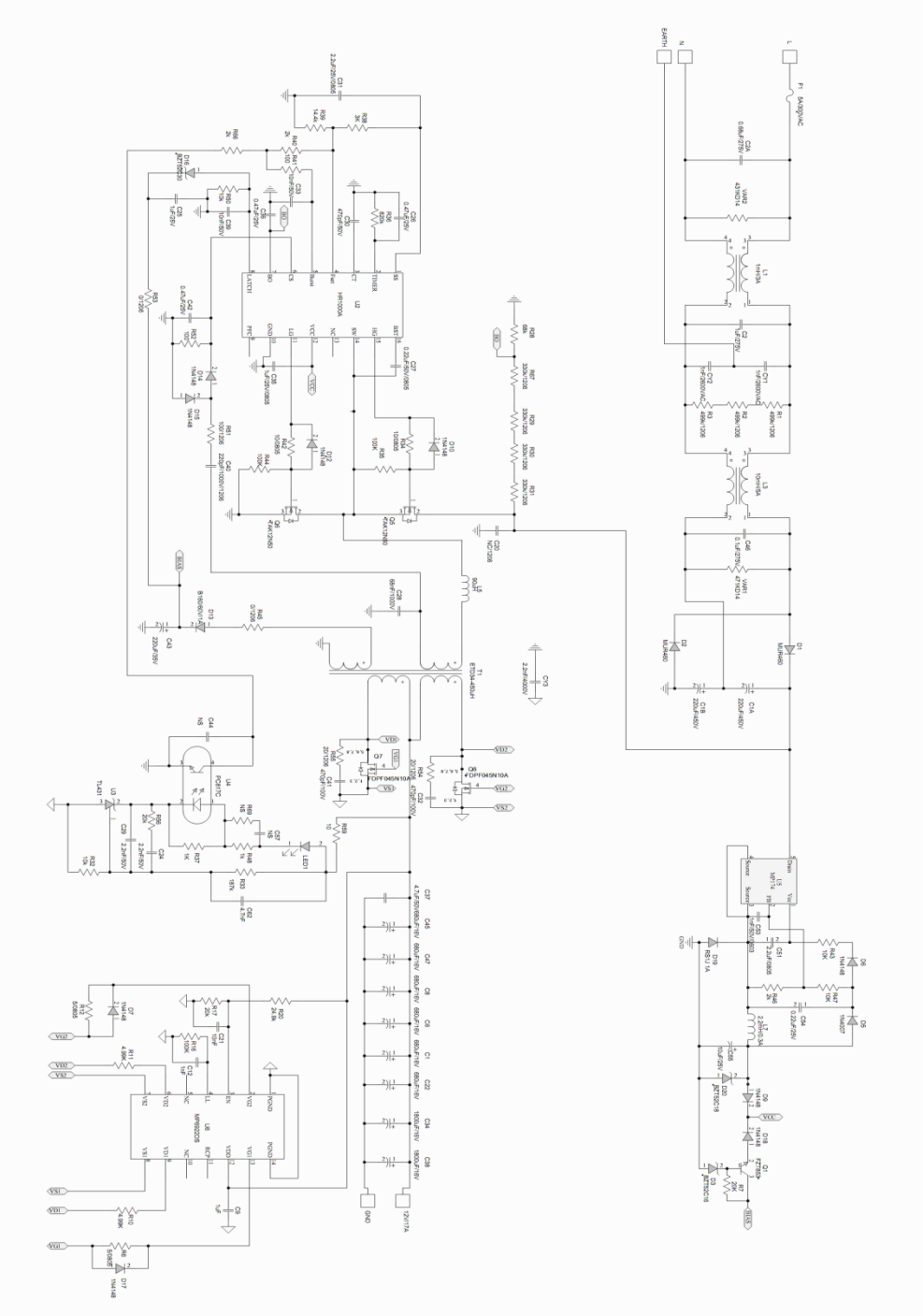
*By estimate

FEATURES

- High Efficiency
- Very Low No-Load Power Consumption
- Output Short Circuit Protection
- Over Voltage Protection

Warning: Although this board is designed to satisfy safety requirements, the engineering prototype has not been agency approved. Therefore, all testing should be performed using an isolation transformer to provide the AC input to the prototype board.

HR1000A + MP6922(A) DESIGN CONCEPT SCHEMATICS



Design Number	MPS IC Number
HR1000A + MP6922(A)	HR1000A
	MP6922DS

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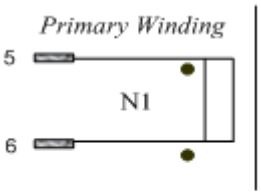
MPS semiconductors are typically used in power supplies in which high voltages are present during operation. High voltage safety precautions should be observed in design and operation to minimize the chance of injury.

APPENDIX: RESONANT INDUCTOR SPECIFICATION

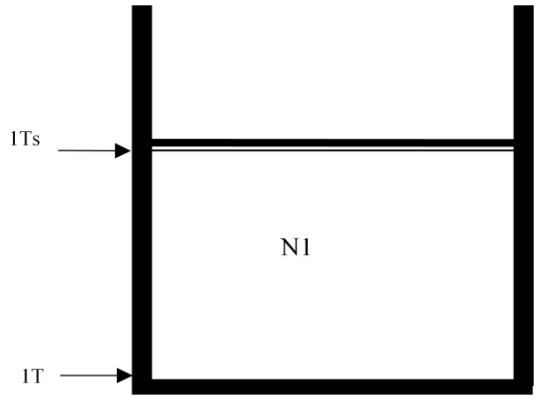
Electrical Diagram



Note: ○ Winding start

Teflon tube

Winding Diagram



Electrical Characteristic

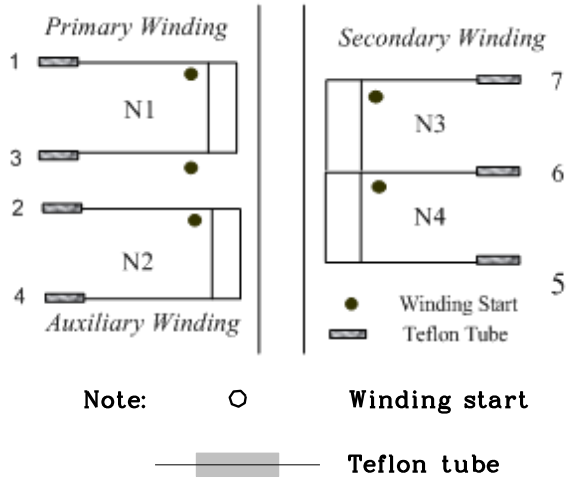
Parameter	Value
Inductance	90μH±5%
Core	EF20
Bobbin	EF20
Core Material	PC40
Turns	35

Winding Specification

Winding Order	Pin Number		Wire Type (Φ)	Number of Turns	Tube
	Start	Finish			
N1	5	6	0.1mm*40	35	Matching with Wire

APPENDIX: LLC TRANSFORMER SPECIFICATION

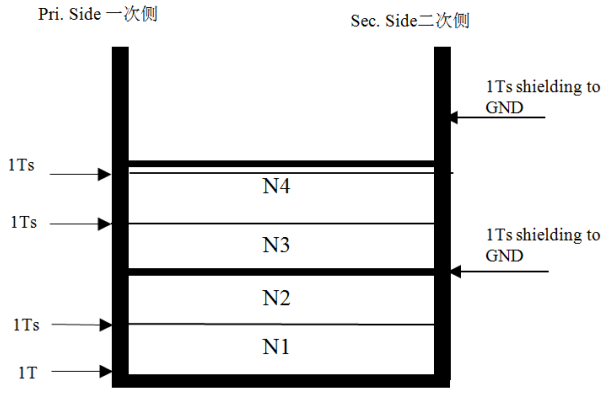
Electrical Diagram



Note: ○ Winding start

Teflon tube

Winding Diagram



Electrical Characteristic

Parameter	Condition	Value
Primary Inductance		450uH ±5%
Leakage Inductance		5uH ±10%
Core		ETD34
Bobbin		ETD34
Core Material		PC40
Turn Ratio	N1:N2:N3:N4	42:4:3:3

Winding Specification

Winding Order	Pin Number		Wire Type (Φ)	Number of Turns	Tube
	Start	Finish			
N1	1	3	0.1mm*50	42	Matching with Wire
N2	2	4	0.2mm	4	Matching with Wire
N3	5	6	0.1mm*200	3	Matching with Wire
N4	6	7	0.1mm*200	3	Matching with Wire