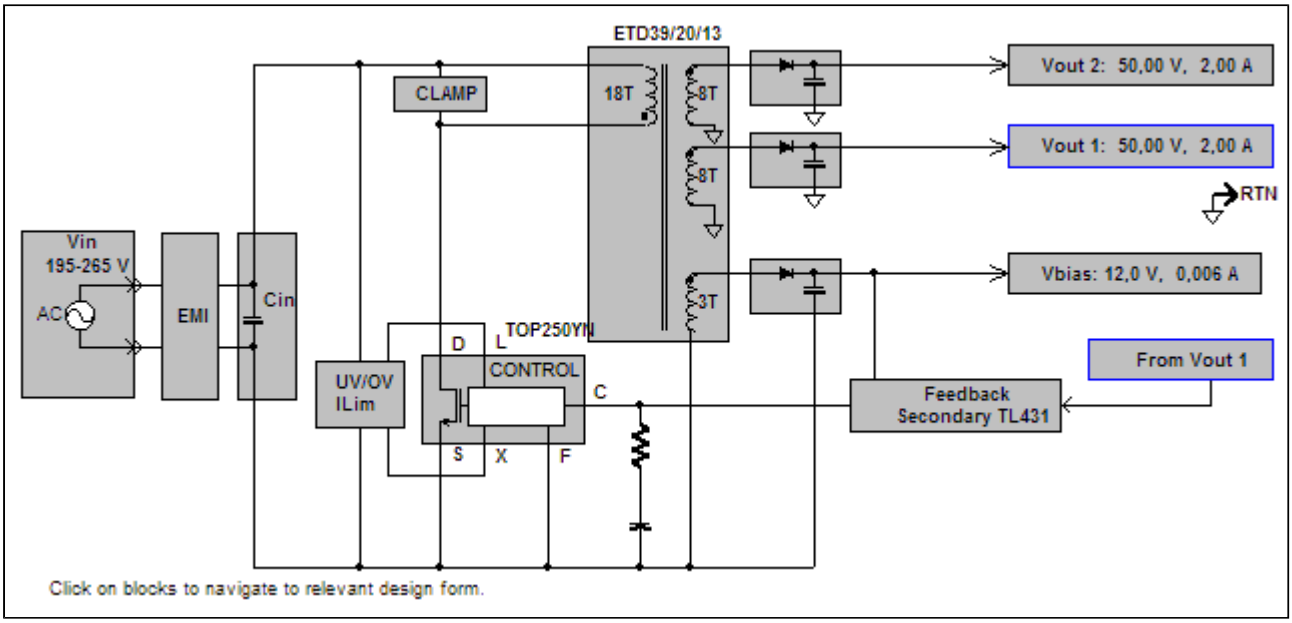
Design Passed (Optimization Done)

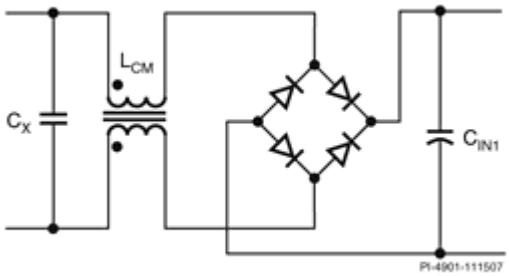
Design Report



Design Results

Power Supply Input

Var	Value	Units	Description
VACMIN	**195**	V	Minimum Input AC Voltage
VACMAX	**265**	V	Maximum Input AC Voltage
FL	**50**	Hz	Line Frequency
TC	**1,98**	ms	Diode Conduction Time
Z	**0,63**		Loss Allocation Factor
η	**82,0**	%	Efficiency Estimate
IAVG	**1,05**	A	Average Diode Bridge Current
Input Rectifier	**1N5408**		Recommended Input Diodes
VMIN	**233,0**	V	Minimum DC Input Voltage
VMAX	**374,8**	V	Maximum DC Input Voltage



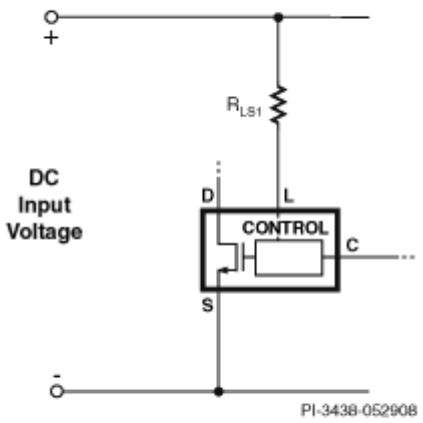
EMI Filter

Var	Value	Units	Description
CIN1	**180,00**	µF	Input Bulk Capacitor
LCM	**6,00**	mH	Common Mode Choke
CX	**0,10**	µF	X Capacitor

Device Variables

Var	Value	Units	Description

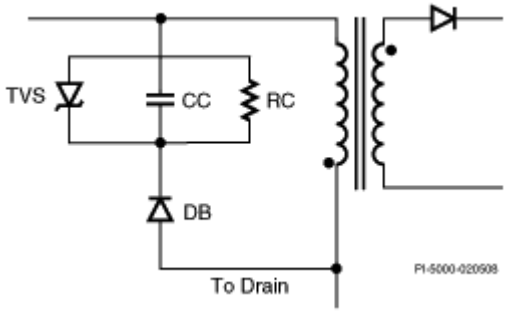
Device	**TOP250YN**		PI Device Name
PO	**200,07**	W	Total Output Power
VDRAIN Estimated	**586,03**	V	Actual Estimated Drain Voltage
VDS	**11,89**	V	On state Drain to Source Voltage
FS	**132000**	Hz	Switching Frequency
KP	**0,88**		Continuous/Discontinuous Operating Ratio
KI	**1,00**		Current Limit Reduction Factor
ILIMITEXT	**5,86**	A	Programmed Current Limit
ILIMITMIN	**5,86**	A	Current Limit Minimum



ILIMITMAX	**6,74**	A	Current Limit Maximum
IP	**5,61**	A	Peak Primary Current (at VMIN)
IRMS	**1,99**	A	Primary RMS Current (at VMIN)
P_NO_LOAD	**500**	mW	Estimated No Load Input Power
DMAX	**0,33**		Maximum Duty Cycle
RLS	**4,7**	MΩ	Line sense resistor

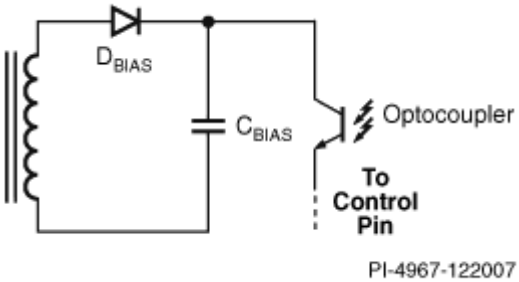
Clamp Components

Var	*Value*	*Units*	*Description*
DB	**FR257**		Recommended Blocking Diode
RC	**9,10**	kΩ	Clamping resistor
CC	**8,200**	nF	Clamp Capacitor
VCLAMP	**173,79**	V	Estimated average clamping voltage
VRZ	**P6KE200A**		Recommended Zener Clamp
Clamp Loss	**3,32**	W	Clamp Dissipation



Bias Variables

Var	*Value*	*Units*	*Description*
VB	**12,0**	V	Bias Voltage
IB	**0,006**	A	Bias Current
VDB	**0,95**	V	Bias Diode Forward Voltage Drop
PIVB	**78**	V	Bias Rectifier Max Peak Inverse Voltage



NB	**3**		Bias Winding Number of Turns
Wire Size	**25**	AWG	Wire size of Bias windings
Winding Type	**Bifilar (x2)**		Wire type of Bias windings
Layers	**0,12**		Bias Winding Layers
Start Pin(s)	**6**		Starting pin(s) for Bias winding
Termination Pin(s)	**5**		Termination pin(s) for Bias winding

Transformer Construction Parameters

Var	*Value*	*Units*	*Description*
Core Type	**ETD39/20/13**		Core Type
Core Material	**NC-2H (Nicera) or Equivalent**		Core Material
Bobbin Reference	**Generic, 8 pri. + 8 sec.**		Bobbin Reference
Bobbin Orientation	**Horizontal**		Bobbin type
Primary Pins	**6**		Number of Primary pins used
Secondary Pins	**4**		Number of Secondary pins used
LP	**111**	µH	Primary Inductance
NP	**17,0**		Calculated Primary Winding Total Number of Turns
NSM	**8**		Secondary Main Number of Turns
CMA	**647**	Cmils/A	Primary Winding Current Capacity
VOR	**110,00**	V	Reflected Output Voltage
BW	**25,70**	mm	Bobbin Winding Width
ML	**0,00**	mm	Safety Margin on Left Width
MR	**0,00**	mm	Safety Margin on Right Width
FF	**56**	%	Actual Transformer Fit Factor. 100% signifies fully utilized winding window
AE	**125,00**	mm²	Core Cross Sectional Area
ALG	**384**	nH/T²	Gapped Core Effective Inductance
BM	**2933**	Gauss	Maximum Flux Density
BP	**3521**	Gauss	Peak Flux Density
BAC	**1286**	Gauss	AC Flux Density for Core Loss
LG	**0,348**	mm	Estimated Gap Length
L_LKG	**1,8**	µH	Primary Leakage Inductance
LSEC	**20**	nH	Secondary Trace Inductance

Primary Winding Section 1

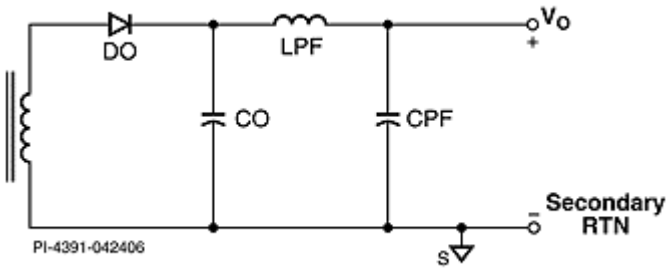
Var	*Value*	*Units*	*Description*
NP1	**9**		Rounded (Integer) Number of Primary winding turns in the first section of primary
Wire Size	**24**	AWG	Wire size of primary winding
Winding Type	**Trifilar (x3)**		Primary winding number of parallel wire strands
L	**0,60**		Primary Number of Layers
DC Copper Loss	**0,05**	W	Primary DC Losses
PIN_S	**4**		Starting pin(s) for first section of primary winding
PIN_T	**2,3**		Termination pin(s) for first section of primary winding

Primary Winding Section 2

Var	*Value*	*Units*	*Description*
NP2	**9**		Rounded (Integer) Number of Primary winding turns in the second section of primary
Wire Size	**24**	AWG	Wire size of primary winding
Winding Type	**Trifilar (x3)**		Primary winding number of parallel wire strands
L2	**0,60**		Primary Number of Layers in 2nd split winding
DC Copper Loss	**0,08**	W	Primary 2 DC Losses
PIN_S2	**2,3**		Starting pin(s) for the second section of primary winding
PIN_T2	**1**		Termination pin(s) for the second section of primary winding

Output 1

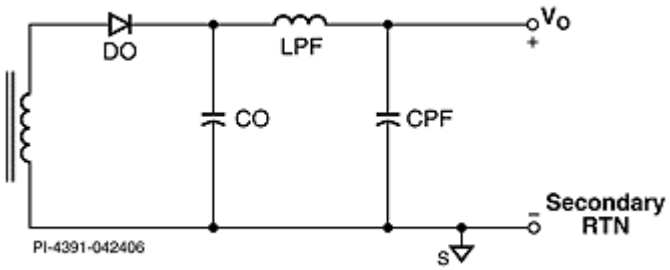
Var	Value	Units	Description
VO	**50,00**	V	Output Voltage
IO	**2,00**	A	Output Current
VOUT_ACTUAL	**50,00**	V	Actual Output Voltage
NS	**8**		Secondary Number of Turns



Wire Size	**25**	AWG	Wire size of secondary winding
Winding Type	**Bifilar (x2)**		Output winding number of parallel strands
L_S_OUT	**0,40**		Secondary Output Winding Layers
DC Copper Loss	**0,26**	W	Secondary DC Losses
Start Pin(s)	**10**		Starting pin(s) for Output winding
Termination Pin(s)	**9**		Termination pin(s) for Output winding
VD	**1,70**	V	Output Winding Diode Forward Voltage Drop
PIVS	**217**	V	Output Rectifier Maximum Peak Inverse Voltage
ISP	**5,97**	A	Peak Secondary Current
ISRMS	**3,00**	A	Secondary RMS Current
DO	**UF5404**		Recommended Output Diode
CO	**680 x 1**	µF	Output Capacitor
IRIPPLE	**2,24**	A	Output Capacitor RMS Ripple Current
Expected Lifetime	**84180**	hr	Expected Lifetime of Output Capacitor
LPF	**2,2 - 10**	µH	Post Filter Inductor
CPF	**100 - 680**	µF	Post Filter Capacitor

Output 2

Var	Value	Units	Description
VO	**50,00**	V	Output Voltage
IO	**2,00**	A	Output Current
VOUT_ACTUAL	**50,00**	V	Actual Output Voltage
NS	**8**		Secondary Number of Turns

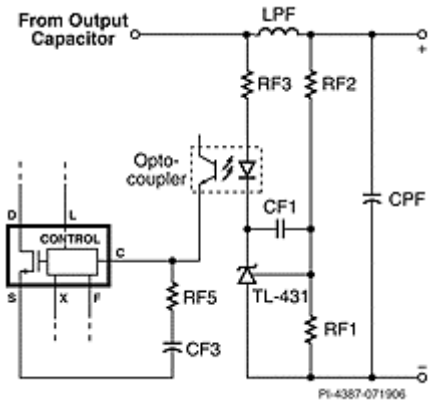


Wire Size	**25**	AWG	Wire size of secondary winding
Winding Type	**Bifilar (x2)**		Output winding number of parallel strands
L_S_OUT	**0,40**		Secondary Output Winding Layers
DC Copper Loss	**0,29**	W	Secondary DC Losses
Start Pin(s)	**12**		Starting pin(s) for Output winding
Termination Pin(s)	**11**		Termination pin(s) for Output winding
VD	**1,70**	V	Output Winding Diode Forward Voltage Drop
PIVS	**217**	V	Output Rectifier Maximum Peak Inverse Voltage
ISP	**5,97**	A	Peak Secondary Current
ISRMS	**3,00**	A	Secondary RMS Current
DO	**UF5404**		Recommended Output Diode
CO	**680 x 1**	µF	Output Capacitor
IRIPPLE	**2,24**	A	Output Capacitor RMS Ripple Current

Expected Lifetime	**84180**	hr	Expected Lifetime of Output Capacitor
LPF	**2,2 - 10**	µH	Post Filter Inductor
CPF	**100 - 680**	µF	Post Filter Capacitor

Feedback Circuit

Var	*Value*	*Units*	*Description*
RF1	**11,30**	kΩ	Feedback Resistor to bias the error Amplifier
RF2	**215,00**	kΩ	**Compensation resistor See Information section for detail**
RF3	**976,00**	Ω	Gain limiting Resistor
RF5	**6,81**	Ω	TOPSwitch Control Pin Resistor
CF1	**15,00**	nF	Compensation Capacitor
CF3	**47,00**	µF	TOPSwitch Control Pin Capacitor
Opto CTR	**80,00**		Optocoupler Current Transfer Ratio
Error Amp Gain	**55,00**	dB	Error Amplifier Open Loop Gain
PM	**97,21**	Deg	Estimated Phase Margin
FC_ACTUAL	**1020,7**	Hz	Estimated Crossover Frequency



The regulation and tolerances do not account for thermal drifting and component tolerance of the output diode forward voltage drop and voltage drops across the LC post filter. The actual voltage values are estimated at full load only.

Please verify cross regulation performance on the bench.

Errors, Warnings, Information

Description	*Fix*	*Show me*	*Ref. #*
Drain voltage close to BVDSS at maximum OV threshold.	Verify BVDSS during line surge, decrease VUVON_MAX or reduce VOR.		237
Resistor value is too large and may not provide enough bias for error amplifier. Decrease Resistor.	Decrease RF2		606