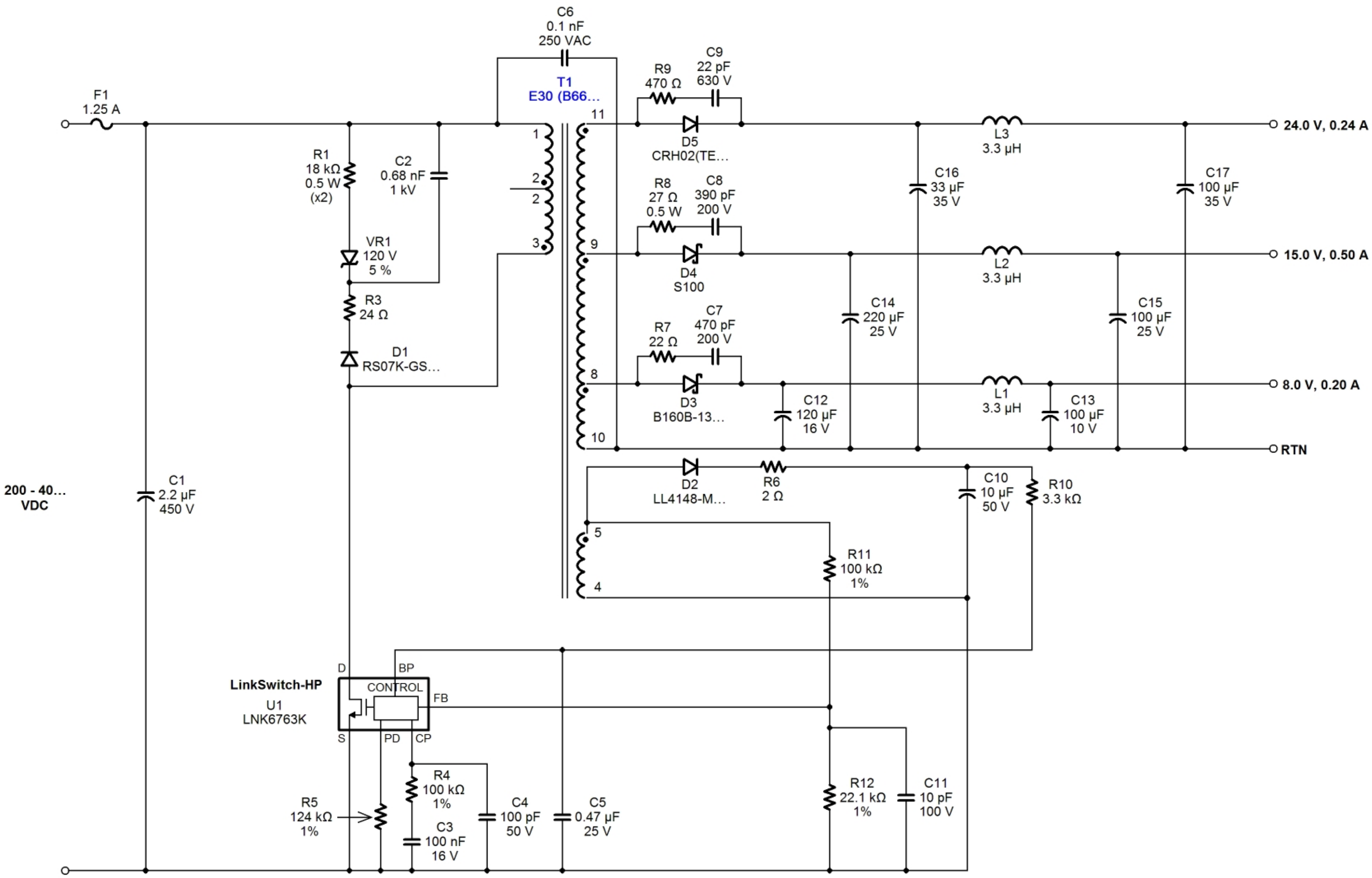


Schematic components that have been frozen by the user will appear with blue reference designators.

Power Supply Input

Var	Value	Units	Description
VDCMIN	**200**	V	Minimum Input DC Voltage (Manual Overwrite)
VDCMAX	**400**	V	Maximum Input DC Voltage (Manual Overwrite)
Z	**0.47**		Loss Allocation Factor
η	**84.0**	%	Efficiency Estimate (Target)

Input Section

Var	Value	Units	Description
Fuse	**1.25**	A	Input Fuse Rated Current
IAVG	**0.09**	A	Average Diode Bridge Current (DC Input Current)

Device Variables

Var	Value	Units	Description
Device	**LNK6763K**		PI Device Name
BVDSS	**650**	V	Drn-Src Bkdn Voltage
Current Limit Mode	**Default**		Device Current Limit Mode
PO	**14.87**	W	Total Output Power
VDRAIN Estimated	**585.53**	V	Estimated Drain Voltage
VDS	**5.31**	V	On state Drain to Source Voltage
FS	**132000**	Hz	Switching Frequency (at VMIN and Full Load)
FMIN_OTE	**124000**	Hz	Minimum Switching Frequency During On-Time Extension
FMAX_OTE	**140000**	Hz	Maximum Switching Frequency During On-Time Extension
TSAMPLE_FULL_LOAD	**4.72**	μs	Auxiliary Winding Sample Time at Full Load
TSAMPLE_NO_LOAD	**3.19**	μs	Auxiliary Winding Sample Time at No Load
KP	**0.700**		Continuous/Discontinuous Operating Ratio (at VMIN and Full Load)
DMAX	**0.339**		Maximum Duty Cycle (at VMIN and Full Load)
KI	**1.00**		Current Limit Reduction Factor
ILIMITEXT	**0.72**	A	Programmed Current Limit
ILIMITMIN	**0.716**	A	Minimum Current Limit
ILIMITMAX	**0.824**	A	Maximum Current Limit
AROTE_FLAG	**NO**		Auto Restart On-Time Extension Enable
AROTE_ACT	**1**	ms	Actual Auto Restart On-Time Extension
IP	**0.401**	A	Peak Primary Current (at VMIN and Full Load)
IRMS	**0.159**	A	Primary RMS Current (at VMIN and Full Load)
RTH_DEVICE	**142.82**	°C/W	PI Device Heatsink Maximum Thermal Resistance
DEV_HSINK_TYPE	**2 Oz (70 μ) 2-Sided Copper PCB**		PI Device Heatsink Type
DEV_HSINK_AREA	**52**	mm²	PI Device Heatsink Area

Clamp Circuit

Var	Value	Units	Description
Clamp Type	**RCDZ Clamp**		*Clamp Circuit Type*
VCLAMP	**85.53**	*V*	*Average Clamping Voltage*
Estimated Clamp Loss	**1.371**	*W*	*Clamp total power loss*
VC_MARGIN	**50.00**	*V*	*Clamp Voltage Safety Margin*
TPRIMARY	**0.97**	*µs*	*Primary Drain Voltage Ring Decay Time*

Primary Bias Variables

Var	Value	Units	Description
VB	**10.0**	*V*	*Bias Voltage*
IB	**0.001**	*A*	*Bias Current*
PIVB	**56**	*V*	*Bias Rectifier Maximum Peak Inverse Voltage*

Feedback Winding

Var	Value	Units	Description
NFB	**19**		*Feedback Winding Number of Turns*
VFB	**25.00**		*Feedback pin voltage*
Layers	**0.94**		*Feedback Winding Layers*

Transformer Construction Parameters

Var	Value	Units	Description
Core Type	**E30 (B66319)**		*Core Type (Manual Overwrite)*
Core Material	**N87**		*Core Material (Manual Overwrite)*
Primary Pins	**5**		*Number of Primary pins used*
Secondary Pins	**4**		*Number of Secondary pins used*
USE_SHIELDS	**NO**		*Use shield Windings*
LP_nom	**1980**	*µH*	*Nominal Primary Inductance*
LP_Tol	**10.0**	*%*	*Primary Inductance Tolerance*
NP	**164.0**		*Calculated Primary Winding Total Number of Turns*
NSM	**26**		*Secondary Main Number of Turns (Manual Overwrite)*
CMA	**249.44**	*Cmils/A*	*Primary Winding Current Capacity*
VOR	**100.00**	*V*	*Reflected Output Voltage*
BW	**17.50**	*mm*	*Bobbin Winding Width*
FF	**54.63**	*%*	*Actual Transformer Fit Factor. 100% signifies fully utilized winding window*
TSAMPLE_FULL_LOAD	**4.72**	*µs*	*Auxiliary Winding Sample Time at Full Load*
TSAMPLE_NO_LOAD	**3.19**	*µs*	*Auxiliary Winding Sample Time at No Load*
AE	**60.00**	*mm^2*	*Core Cross Sectional Area*
ALG	**74**	*nH/T^2*	*Gapped Core Specific Inductance*
BM	**807**	*Gauss*	*Maximum Flux Density*
BP	**1824**	*Gauss*	*Peak Flux Density*
BAC	**283**	*Gauss*	*AC Flux Density for Core Loss*
LG	*0.985*	*mm*	*Estimated Gap Length. See Information section for detail*

L_LKG	**19.80**	μH	Estimated primary leakage inductance
LSEC	**20**	nH	Secondary Trace Inductance

Primary Winding Section 1

Var	Value	Units	Description
NP1	**83**		Number of Primary Winding Turns in the First Section of Primary
L	**0.90**		Primary Winding - Number of Layers
DC Copper Loss	**0.08**	W	Primary Section 1 DC Losses

Primary Winding Section 2

Var	Value	Units	Description
NP2	**82**		Rounded (Integer) Number of Primary winding turns in the second section of primary
L2	**0.89**		Primary Number of Layers in 2nd split winding

Output 1

Var	Value	Units	Description
VO	**24.00**	V	Typical Output Voltage
IO	**0.24**	A	Output Current
VOUT_ACTUAL	**24.04**	V	Actual Output Voltage
NS	**15**		Secondary Number of Turns
L_S_OUT	**0.36**		Secondary Output Winding Layers
DC Copper Loss	**0.05**	W	Secondary DC Losses
VD	**0.95**	V	Output Winding Diode Forward Voltage Drop
VD	**0.95**	V	Output Winding Diode Forward Voltage Drop
PIVS	**123.44**	V	Output Rectifier Maximum Peak Inverse Voltage
ISP	**0.613**	A	Peak Secondary Current
ISRMS	**0.339**	A	Secondary RMS Current
ISRMS_WINDING	**0.339**	A	Secondary Winding RMS Current
CMAS	**234**	Cmils/A	Secondary Winding Current Capacity
RTH_RECTIFIER	**222.06**	°C/W	Output Rectifier Heatsink Maximum Thermal Resistance
OR_HSINK_TYPE	**2 Oz (70 µ) 2-Sided Copper PCB**		Output Rectifier Heatsink Type
OR_HSINK_AREA	**52**	mm²	Output Rectifier Heatsink Area
CO	**33 x 1**	μF	Output Capacitor - Capacitance
IRIPPLE	**0.240**	A	Output Capacitor - RMS Ripple Current
Expected Lifetime	**16931**	hr	Output Capacitor - Expected Lifetime

Output 2

Var	Value	Units	Description
VO	**15.00**	V	Typical Output Voltage
IO	**0.50**	A	Output Current
VOUT_ACTUAL	**15.00**	V	Actual Output Voltage
NS	**12**		Secondary Number of Turns
L_S_OUT	**0.41**		Secondary Output Winding Layers

DC Copper Loss	**0.11**	*W*	*Secondary DC Losses*
VD	**0.85**	*V*	*Output Winding Diode Forward Voltage Drop*
VD	**0.85**	*V*	*Output Winding Diode Forward Voltage Drop*
PIVS	**78.03**	*V*	*Output Rectifier Maximum Peak Inverse Voltage*
ISP	**1.277**	*A*	*Peak Secondary Current*
ISRMS	**0.706**	*A*	*Secondary RMS Current*
ISRMS_WINDING	**1.046**	*A*	*Secondary Winding RMS Current*
CMAS	**242**	*Cmils/A*	*Secondary Winding Current Capacity*
RTH_RECTIFIER	**126.03**	*°C/W*	*Output Rectifier Heatsink Maximum Thermal Resistance*
OR_HSINK_TYPE	**2 Oz (70 µ) 2-Sided Copper PCB**		*Output Rectifier Heatsink Type*
OR_HSINK_AREA	**52**	*mm²*	*Output Rectifier Heatsink Area*
CO	**220 x 1**	*µF*	*Output Capacitor - Capacitance*
IRIPPLE	**0.499**	*A*	*Output Capacitor - RMS Ripple Current*
Expected Lifetime	**35596**	*hr*	*Output Capacitor - Expected Lifetime*

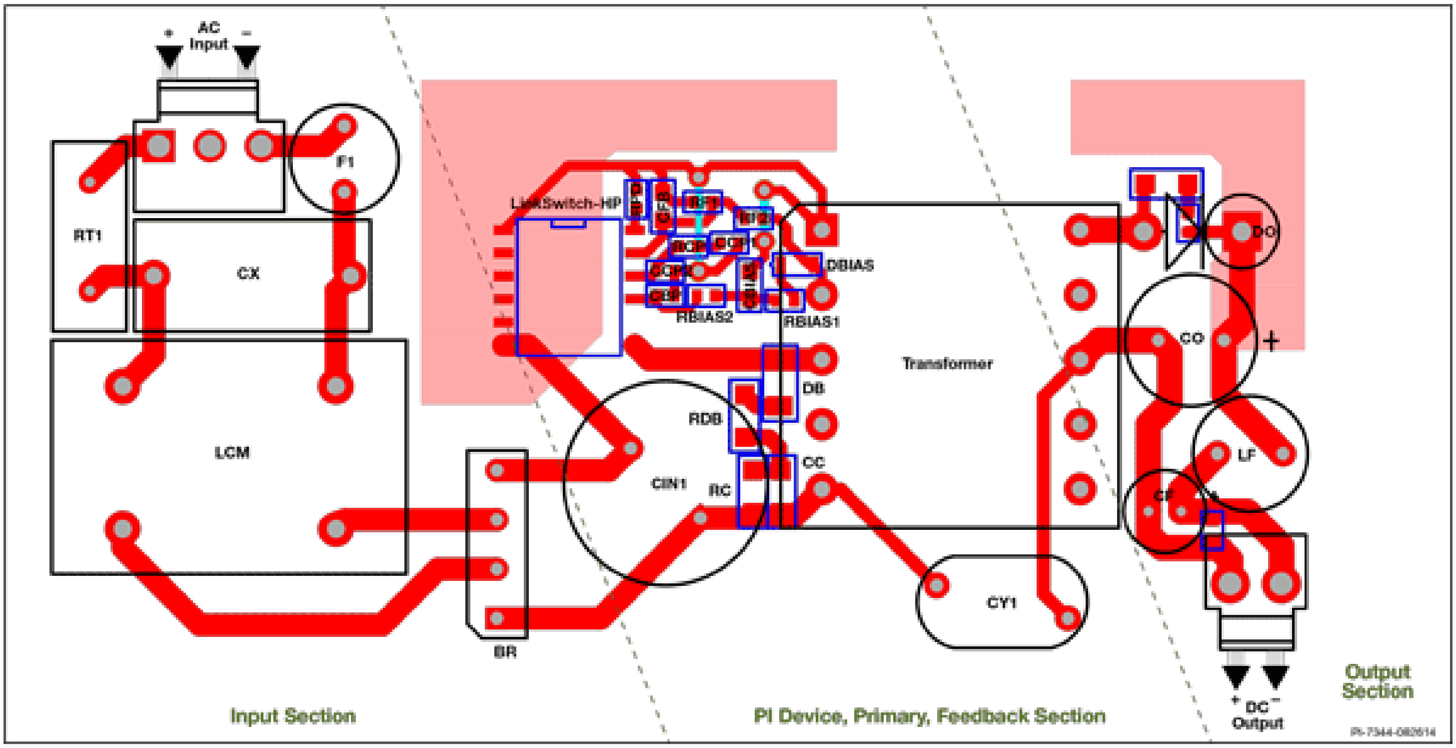
Output 3

Var	***Value***	***Units***	***Description***
VO	**8.00**	*V*	*Typical Output Voltage*
IO	**0.20**	*A*	*Output Current*
VOUT_ACTUAL	**7.83**	*V*	*Actual Output Voltage*
NS	**14**		*Secondary Number of Turns*
L_S_OUT	**0.52**		*Secondary Output Winding Layers*
DC Copper Loss	**0.15**	*W*	*Secondary DC Losses*
VD	**0.70**	*V*	*Output Winding Diode Forward Voltage Drop*
VD	**0.70**	*V*	*Output Winding Diode Forward Voltage Drop*
PIVS	**41.77**	*V*	*Output Rectifier Maximum Peak Inverse Voltage*
ISP	**0.511**	*A*	*Peak Secondary Current*
ISRMS	**0.283**	*A*	*Secondary RMS Current*
ISRMS_WINDING	**1.328**	*A*	*Secondary Winding RMS Current*
CMAS	**241**	*Cmils/A*	*Secondary Winding Current Capacity*
RTH_RECTIFIER	**418.64**	*°C/W*	*Output Rectifier Heatsink Maximum Thermal Resistance*
OR_HSINK_TYPE	**2 Oz (70 µ) 2-Sided Copper PCB**		*Output Rectifier Heatsink Type*
OR_HSINK_AREA	**52**	*mm²*	*Output Rectifier Heatsink Area*
CO	**120 x 1**	*µF*	*Output Capacitor - Capacitance*
IRIPPLE	**0.200**	*A*	*Output Capacitor - RMS Ripple Current*
Expected Lifetime	**27039**	*hr*	*Output Capacitor - Expected Lifetime*

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.

Board Layout Recommendations



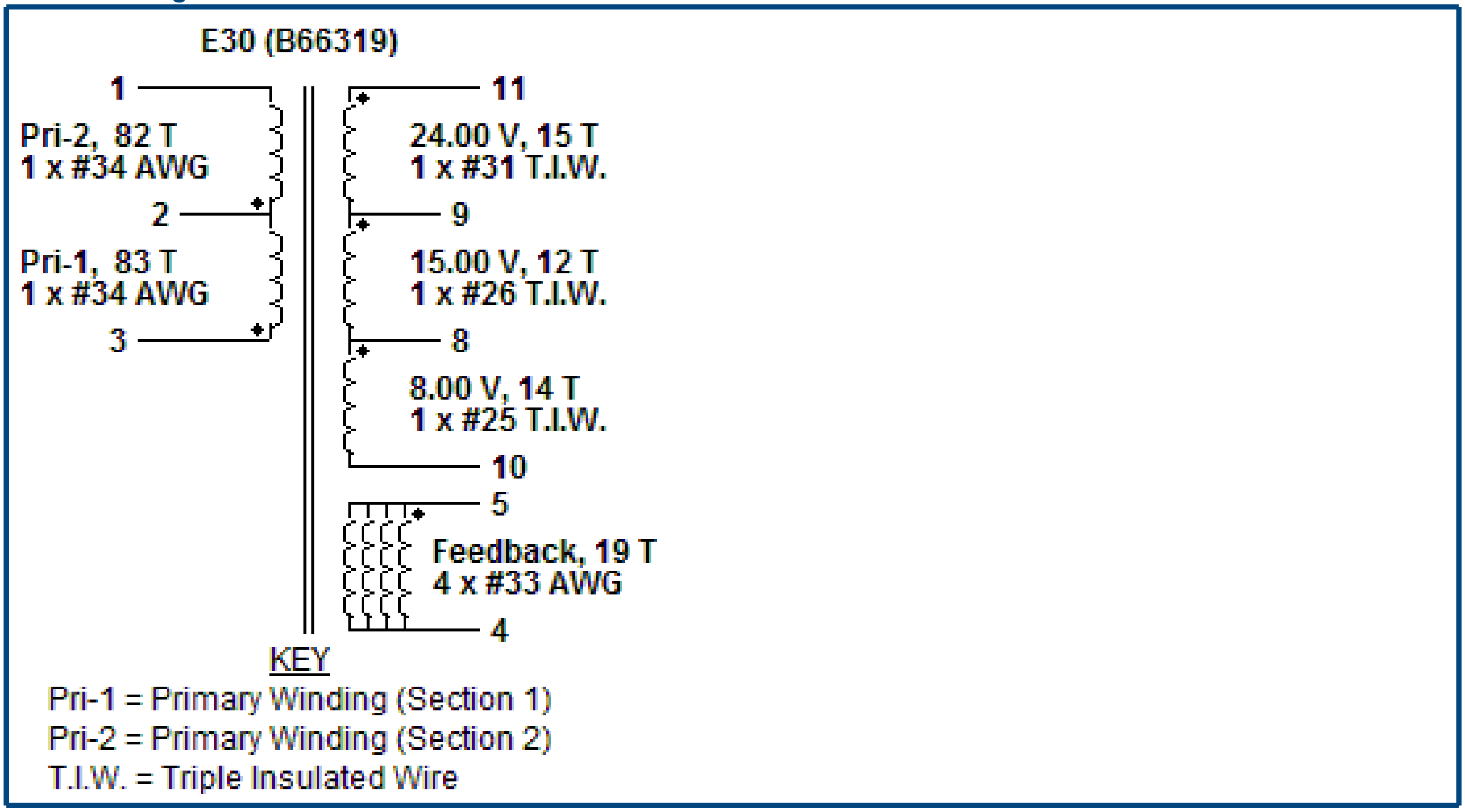
Click on the "Show me" icon to highlight relevant areas on the sample layout.		
	Description	*Show Me*
1	*Minimize loop area formed by drain, input capacitor and transformer*	
2	*Minimize loop area formed by secondary winding, the output rectifier and the output filter capacitor*	
3	*Minimize the loop area formed by the clamp blocking diode, the damping resistor and the snubber capacitor*	
4	*Place the FB/BP/CP pin components as close to the pin as possible. These signal traces should be routed separately from the power traces. Use of kelvin connection for this purpose is highly recommended.*	
5	*A large copper area on the cathode of the secondary rectifier is acceptable since this is a quiet node and the larger copper area actually provides heatsinking to the rectifier*	
6	*The Y capacitor should be placed directly from the primary input filter capacitor positive terminal to the common/return terminal of the transformer secondary*	

Bill Of Materials

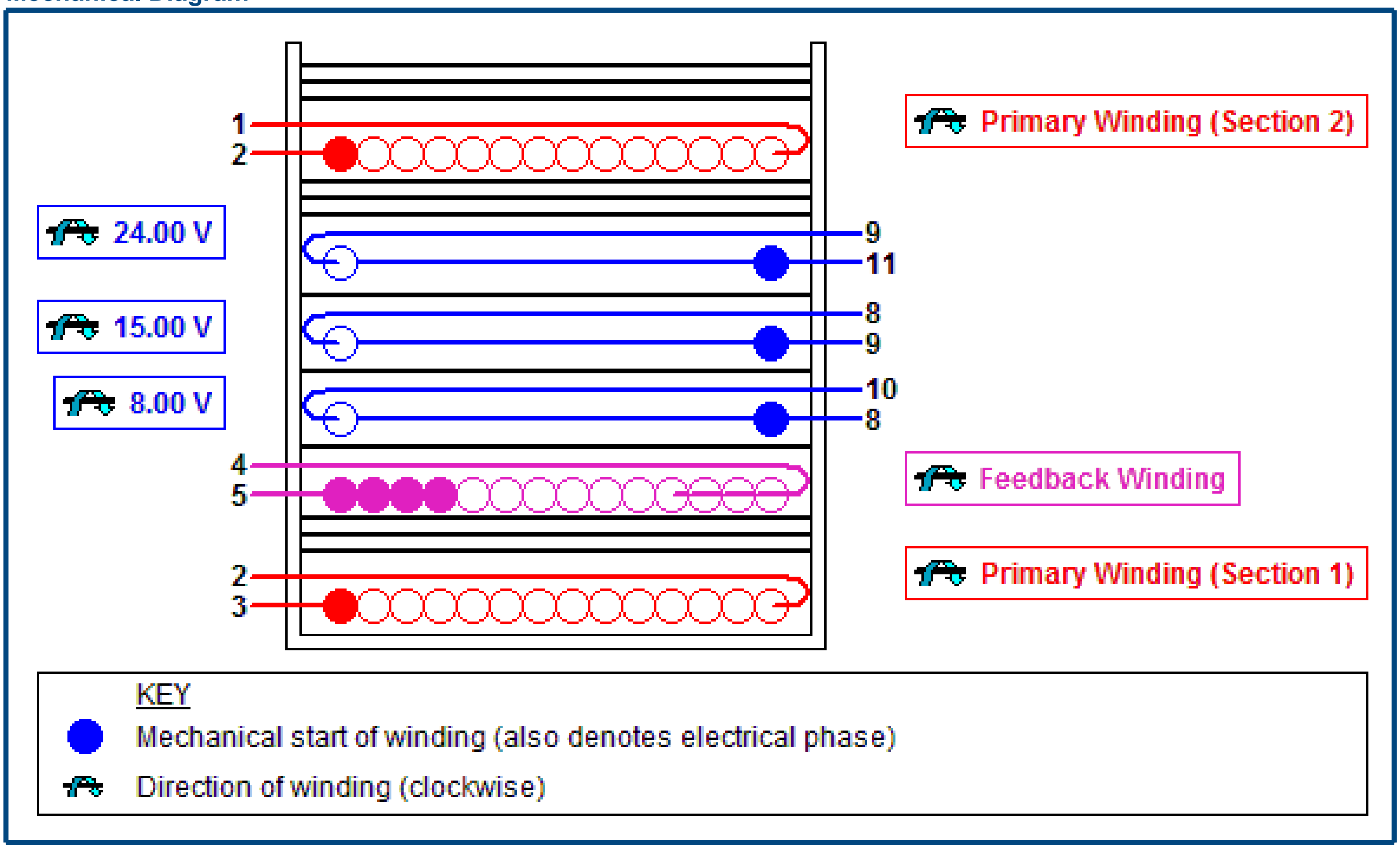
Item #	Quantity	Part Ref	Value	Description	Mfg	Mfg Part Number
1	1	C1	2.2 µF	2.2 µF, 450 V, High Voltage Al Electrolytic, (13.5 mm x 10 mm)	Panasonic	EEV-EB2W2R2Q
2	1	C2	0.68 nF	0.68 nF, 1 kV, High Voltage Ceramic	Kemet	C1206C681KDRACTU
3	1	C3	100 nF	100 nF, 16 V, Ceramic, X7R	AVX Corp	0603YC104K4T4A
4	1	C4	100 pF	100 pF, 50 V, Ceramic, C0G	Wurth Elektronik	885012009011
5	1	C5	0.47 µF	0.47 µF, 25 V, Ceramic, X7R	Kemet	C0805C474K3RAC7800
6	1	C6	0.1 nF	0.1 nF, 250 VAC, Ceramic, Y Class	Murata	GA342QR7GF101KW01L
7	1	C7	470 pF	470 pF, 200 V, High Voltage Ceramic	Kemet	C0805C471K2RACAUTO
8	1	C8	390 pF	390 pF, 200 V, High Voltage Ceramic	AVX Corp	08052C391KAT2A
9	1	C9	22 pF	22 pF, 630 V, High Voltage Ceramic	Murata	GRM31A5C2J220JW01D
10	1	C10	10 µF	10 µF, 50 V, Electrolytic, Gen Purpose, 1000 mΩ, (6.1 mm x 6.3 mm)	Rubycon	50TRV10M6.3X6.1
11	1	C11	10 pF	10 pF, 100 V, Ceramic, C0G	Kemet	K100J15C0GH5TL2
12	1	C12	120 µF	120 µF, 16 V, Electrolytic, Super Low ESR, 22 mΩ, (11 mm x 6.3 mm)	United Chemi-Con	EKZE160ELL121MF11D
13	1	C13	100 µF	100 µF, 10.0 V, Electrolytic, Low ESR, 500 mΩ, (3.5 mm x 2.8 mm)	Kemet	T495B107M010ATE500
14	1	C14	220 µF	220 µF, 25 V, Electrolytic, Super Low ESR, 72 mΩ, (11.5 mm x 8 mm)	United Chemi-Con	EKZE250ELL221MHB5D
15	1	C15	100 µF	100 µF, 25 V, Electrolytic, Low ESR, 260 mΩ, (8 mm x 6.2 mm)	Panasonic	EEEFK1E101AP
16	1	C16	33 µF	33 µF, 35 V, Electrolytic, Super Low ESR, 300 mΩ, (11 mm x 5 mm)	United Chemi-Con	EKZE350ELL330ME11D
17	1	C17	100 µF	100 µF, 35 V, Electrolytic, Low ESR, 80 mΩ, (10.2 mm x 8 mm)	Panasonic	EEE-FP1V101AP
18	1	D1	RS07K-GS08	800 V, 1.4 A, Fast Recovery, 300 ns, DO-219AB	Vishay	RS07K-GS08
19	1	D2	LL4148-M-08	100 V, 0.15 A, Fast Recovery, 8 ns, SOD-80	Vishay	LL4148-M-08
20	1	D3	B160B-13-F	60 V, 1 A, Schottky, DO-214AA	Diodes Inc.	B160B-13-F
21	1	D4	S100	100 V, 1 A, Schottky, DO-214AC	ON Semiconductor	S100
22	1	D5	CRH02(TE85L, Q,M)	200 V, 0.5 A, Ultrafast Recovery, 35 ns, TO-220-3F	Toshiba	CRH02(TE85L,Q,M)
23	1	F1	1.25 A	600 VAC, 1.25 A, Glass Cartridge, Time Lag Fuse	Littelfuse	04611.25ER
24	3	L1, L2, L3	3.3 µH	3.3 µH, 2.6 A	Murata	LQH66SN3R3M03L
25	2	R1, R2	18 kΩ	18 kΩ, 5 %, 0.5 W, Thick Film	Generic	
26	1	R3	24 Ω	24 Ω, 5 %, 0.25 W, Thick Film	Generic	
27	2	R4, R11	100 kΩ	100 kΩ, 1 %, 0.25 W, Thick Film	Generic	
28	1	R5	124 kΩ	124 kΩ, 1 %, 0.125 W, Thick Film	Generic	
29	1	R6	2 Ω	2 Ω, 5 %, 0.125 W, Thick Film	Generic	
30	1	R7	22 Ω	22 Ω, 5 %, 0.25 W, Thick Film	Generic	
31	1	R8	27 Ω	27 Ω, 5 %, 0.5 W, Thick Film	Generic	
32	1	R9	470 Ω	470 Ω, 5 %, 0.25 W, Thick Film	Generic	

33	1	R10	3.3 kΩ	3.3 kΩ, 5 %, 0.125 W, Thick Film	Generic	
34	1	R12	22.1 kΩ	22.1 kΩ, 1 %, 0.125 W, Thick Film	Generic	
35	1	T1	E30 (B66319)	3F3 Core Material Refer to Manufacturer datasheet for a number of parts to purchase	EPCOS (TDK)	B66319
36	1	T1 Bobbin	E30/15/7 - 1 (P7-S7)	Bobbin Material : GFR polyterephthalate	EPCOS (TDK)	B66232
37	1	T1 Core Acc.1	B66232	Yoke . Stainless spring steel (0.4mm)	EPCOS (TDK)	B66232
38	1	T1 Core Acc.2	CLA-E30/15/7	Clasp . CuZn Alloy, Ni plated	Ferroxcube	CLA-E30/15/7
39	1	T1 Core Acc.3	SPR-E30/15/7	Spring . Stainless steel (CrNi)	Ferroxcube	SPR-E30/15/7
40	1	U1	LNK6763K	LinkSwitch-HP, LNK6763K, eSOP-12B	Power Integrations	LNK6763K
41	1	VR1	P6SMB120CA	120 V, 5 W, 5 %, DO-214AA, TVS	Vishay	P6SMB120CA
42	1			52 mm² area on Copper PCB. 2 oz (70 µm) thickness. Heatsink for use with Rectifier D3.	Custom	
43	1			52 mm² area on Copper PCB. 2 oz (70 µm) thickness. Heatsink for use with Rectifier D5.	Custom	
44	1			52 mm² area on Copper PCB. 2 oz (70 µm) thickness. Heatsink for use with Device U1.	Custom	
45	1			52 mm² area on Copper PCB. 2 oz (70 µm) thickness. Heatsink for use with Rectifier D4.	Custom	

Electrical Diagram



Mechanical Diagram



Winding Instruction

Primary Winding (Section 1)

Start on pin(s) 3 and wind 83 turns (x 1 filar) of item [5]. in 1 layer(s) from left to right. Winding direction is clockwise. On the final layer, spread the winding evenly across entire bobbin. Finish this winding on pin(s) 2.

Add 3 layers of tape, item [3], for insulation.

Feedback Winding

Start on any (temp) pin on the secondary side and wind 19 turns (x 4 filar) of item [6]. Winding direction is clockwise. Spread the winding evenly across entire bobbin. Finish this winding on pin(s) 4. Move end of wire from temp pin and terminate it on pin 5.

Add 1 layer of tape, item [3], for insulation.

Secondary Winding

Start on pin(s) 8 and wind 14 turns (x 1 filar) of item [7]. Spread the winding evenly across entire bobbin. Winding direction is clockwise. Finish this winding on pin(s) 10.

Add 1 layer of tape, item [3], for insulation.

Start on pin(s) 9 and wind 12 turns (x 1 filar) of item [8]. Spread the winding evenly across entire bobbin. Winding direction is clockwise. Finish this winding on pin(s) 8.

Add 1 layer of tape, item [3], for insulation.

Start on pin(s) 11 and wind 15 turns (x 1 filar) of item [9]. Spread the winding evenly across entire bobbin. Winding direction is clockwise. Finish this winding on pin(s) 9.

Add 3 layers of tape, item [3], for insulation.

Primary Winding (Section 2)

Start on pin(s) 2 and wind 82 turns (x 1 filar) of item [5]. in 1 layer(s) from left to right. Winding direction is clockwise. On the final layer, spread the winding evenly across entire bobbin. Finish this winding on pin(s) 1.

Add 3 layers of tape, item [3], for insulation.

Core Assembly

Assemble and secure core halves. Item [1].

Varnish

Dip varnish uniformly in item [4]. Do not vacuum impregnate.

Comments

1. Use of a grounded flux-band around the core may improve the EMI performance.
2. For non margin wound transformers use triple insulated wire for all secondary windings.

Materials

Item	***Description***
[1]	**Core: E30 (B66319), 3F3, gapped for ALG of 74 nH/T²**
[2]	**Bobbin: Generic, 7 pri. + 7 sec.**
[3]	**Barrier Tape: Polyester film [1 mil (25 µm) base thickness], 17.50 mm wide**
[4]	**Varnish**
[5]	**Magnet Wire: 34 AWG (0.16 mm), Solderable Double Coated**
[6]	**Magnet Wire: 33 AWG (0.18 mm), Solderable Double Coated**
[7]	**Triple Insulated Wire: 25 AWG (0.45 mm)**
[8]	**Triple Insulated Wire: 26 AWG (0.4 mm)**
[9]	**Triple Insulated Wire: 31 AWG (0.22 mm)**

Electrical Test Specifications

Parameter	***Condition***	***Spec***
Electrical Strength, VAC	**60 Hz 1 second, from pins 1,2,3,4,5 to pins 8,9,10,11.**	**3000**
Nominal Primary Inductance, µH	**Measured at 1 V pk-pk, typical switching frequency, between pin 1 to pin 3, with all other Windings open.**	**1980**
Tolerance, ±%	**Tolerance of Primary Inductance**	**10.0**
Maximum Primary Leakage, µH	**Measured between Pin 1 to Pin 3, with all other Windings shorted.**	**19.80**

Although the design of the software considered safety guidelines, it is the user's responsibility to ensure that the user's power supply design meets all applicable safety requirements of user's product.

1 *Design Passed (No Optimization)*

	Description	*Fix*	*Ref. #*
	Gap length too big.	*Decrease transformer size, decrease secondary turns (NS), decrease KP.*	*217*
	The power capability of PI device is assuming that IR reflow soldering is used. If Wave soldering is used, rated power equals V package rated power.	*Verify soldering technique and derate if necessary.*	*182*
	Drain voltage close to BVDSS at maximum OV threshold.	*Verify BVDSS during line surge, decrease VUVON_MAX or reduce VOR.*	*237*