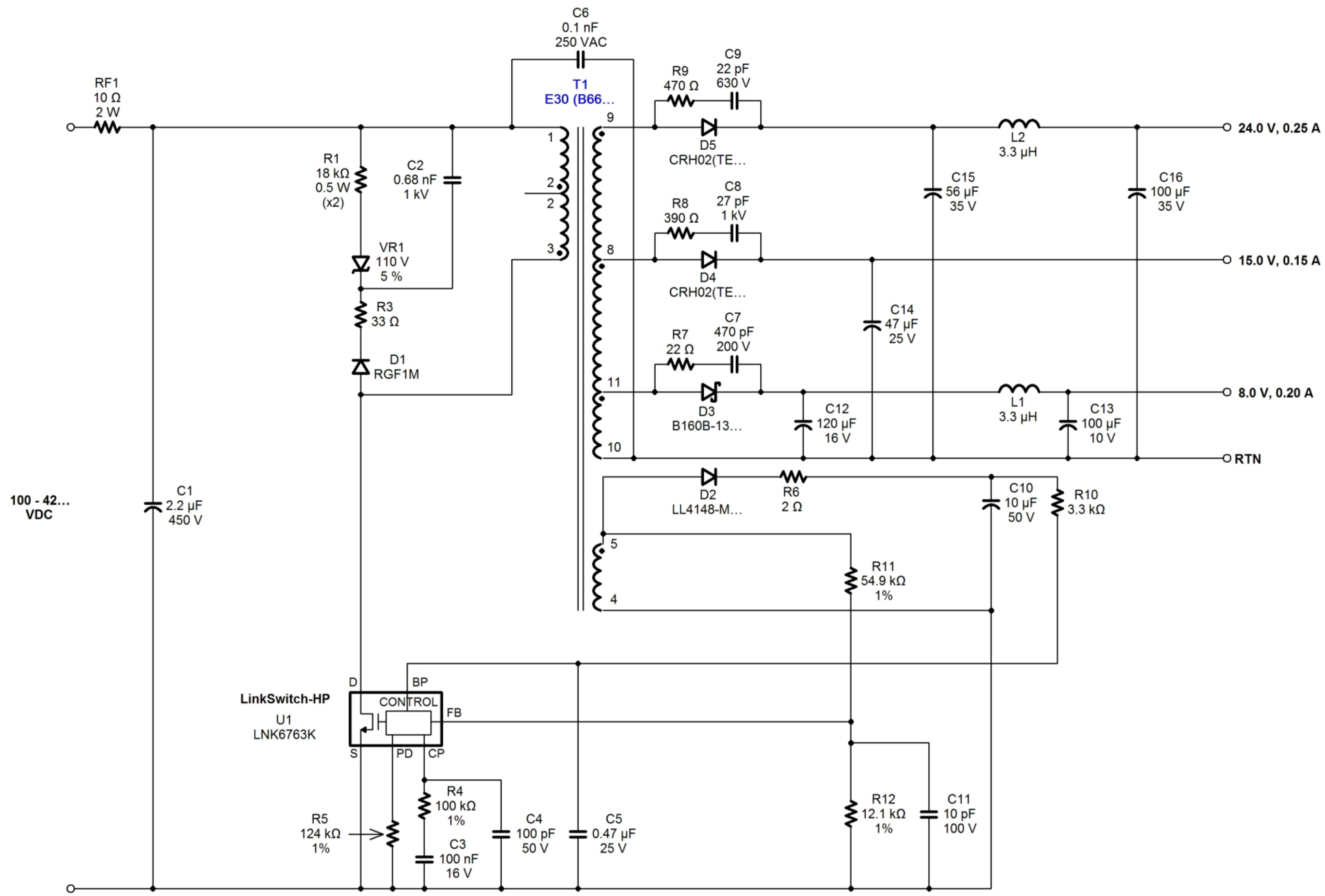


Schematic components that have been frozen by the user will appear with blue reference designators.

Power Supply Input

Var	Value	Units	Description
VDCMIN	**100**	V	Minimum Input DC Voltage (Manual Overwrite)
VDCMAX	**425**	V	Maximum Input DC Voltage (Manual Overwrite)
Z	**0.48**		Loss Allocation Factor
η	**77.0**	%	Efficiency Estimate (Target)

Input Section

Var	Value	Units	Description
RFUSE	10.00	Ω	Fusible Resistor. See Information section for detail
IAVG	**0.13**	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	**9.86**	W	Total Output Power
VDRAIN Estimated	**601.60**	V	Estimated Drain Voltage
VDS	**4.69**	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	**3.67**	µs	Auxiliary Winding Sample Time at Full Load
TSAMPLE_NO_LOAD	**3.63**	µs	Auxiliary Winding Sample Time at No Load
KP	**0.527**		Continuous/Discontinuous Operating Ratio (at VMIN and Full Load)
DMAX	**0.486**		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	**0.358**	A	Peak Primary Current (at VMIN and Full Load)
IRMS	**0.188**	A	Primary RMS Current (at VMIN and Full Load)
RTH_DEVICE	**128.61**	°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	**86.60**	V	Average Clamping Voltage
Estimated Clamp Loss	**1.379**	W	Clamp total power loss
VC_MARGIN	**35.00**	V	Clamp Voltage Safety Margin
TPRIMARY	**0.94**	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	**65**	V	Bias Rectifier Maximum Peak Inverse Voltage

Feedback Winding

Var	Value	Units	Description
NFB	**16**		Feedback Winding Number of Turns
VFB	**13.73**		Feedback pin voltage
Layers	**0.98**		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	**2030**	µH	Nominal Primary Inductance
LP_Tol	**10.0**	%	Primary Inductance Tolerance
NP	**124.1**		Calculated Primary Winding Total Number of Turns
NSM	**12**		Secondary Main Number of Turns (Manual Overwrite)
CMA	**422.17**	Cmils/A	Primary Winding Current Capacity
VOR	**90.00**	V	Reflected Output Voltage (Manual Overwrite)
BW	**17.50**	mm	Bobbin Winding Width
FF	**55.64**	%	Actual Transformer Fit Factor. 100% signifies fully utilized winding window
TSAMPLE_FULL_LOAD	**3.67**	µs	Auxiliary Winding Sample Time at Full Load
TSAMPLE_NO_LOAD	**3.63**	µs	Auxiliary Winding Sample Time at No Load
AE	**60.00**	mm^2	Core Cross Sectional Area
ALG	**132**	nH/T^2	Gapped Core Specific Inductance
BM	**976**	Gauss	Maximum Flux Density
BP	**2470**	Gauss	Peak Flux Density
BAC	**257**	Gauss	AC Flux Density for Core Loss
LG	**0.533**	mm	Estimated Gap Length

L_LKG	20.30	µH	Estimated primary leakage inductance
LSEC	15	nH	Secondary Trace Inductance

Primary Winding Section 1

Var	Value	Units	Description
NP1	63		Number of Primary Winding Turns in the First Section of Primary
L	0.96		Primary Winding - Number of Layers
DC Copper Loss	0.04	W	Primary Section 1 DC Losses

Primary Winding Section 2

Var	Value	Units	Description
NP2	62		Rounded (Integer) Number of Primary winding turns in the second section of primary
L2	0.94		Primary Number of Layers in 2nd split winding

Output 1

Var	Value	Units	Description
VO	24.00	V	Typical Output Voltage
IO	0.25	A	Output Current
VOUT_ACTUAL	23.70	V	Actual Output Voltage
NS	12		Secondary Number of Turns
L_S_OUT	0.31		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	139.30	V	Output Rectifier Maximum Peak Inverse Voltage
ISP	0.751	A	Peak Secondary Current
ISRMS	0.405	A	Secondary RMS Current
ISRMS_WINDING	0.405	A	Secondary Winding RMS Current
CMAS	247	Cmils/A	Secondary Winding Current Capacity
RTH_RECTIFIER	218.60	°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	mm^2	Output Rectifier Heatsink Area
CO	56 x 1	µF	Output Capacitor - Capacitance
IRIPPLE	0.319	A	Output Capacitor - RMS Ripple Current
Expected Lifetime	20826	hr	Output Capacitor - Expected Lifetime

Output 2

Var	Value	Units	Description
VO	15.00	V	Typical Output Voltage
IO	0.15	A	Output Current
VOUT_ACTUAL	15.00	V	Actual Output Voltage
NS	10		Secondary Number of Turns
L_S_OUT	0.30		Secondary Output Winding Layers

DC Copper Loss	**0.06**	*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	**89.80**	*V*	*Output Rectifier Maximum Peak Inverse Voltage*
ISP	**0.451**	*A*	*Peak Secondary Current*
ISRMS	**0.243**	*A*	*Secondary RMS Current*
ISRMS_WINDING	**0.648**	*A*	*Secondary Winding RMS Current*
CMAS	**653**	*Cmils/A*	*Secondary Winding Current Capacity*
RTH_RECTIFIER	**393.19**	*°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	**47 x 1**	*µF*	*Output Capacitor - Capacitance*
IRIPPLE	**0.191**	*A*	*Output Capacitor - RMS Ripple Current*
Expected Lifetime	**21326**	*hr*	*Output Capacitor - Expected Lifetime*

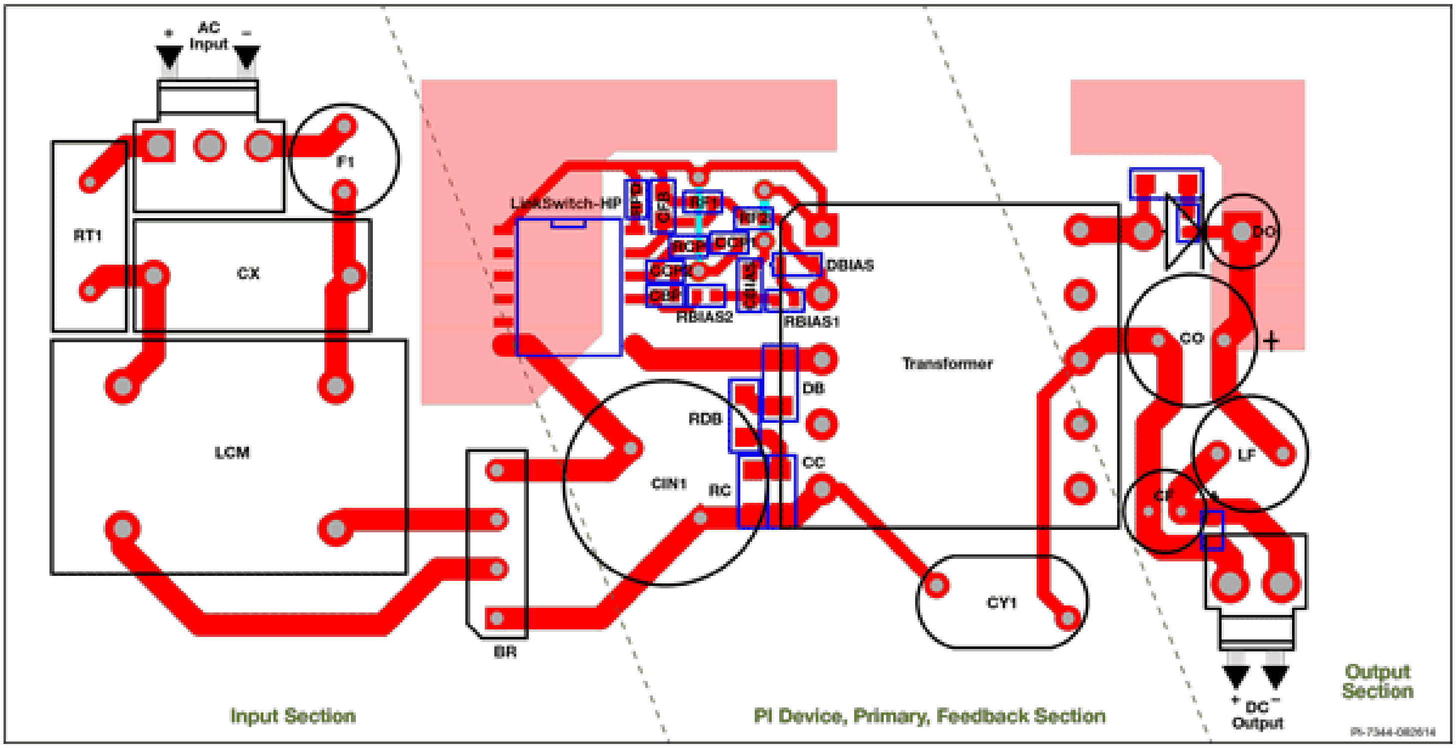
Output 3

Var	*Value*	*Units*	*Description*
VO	**8.00**	*V*	*Typical Output Voltage*
IO	**0.20**	*A*	*Output Current*
VOUT_ACTUAL	**8.00**	*V*	*Actual Output Voltage*
NS	**12**		*Secondary Number of Turns*
L_S_OUT	**0.38**		*Secondary Output Winding Layers*
DC Copper Loss	**0.11**	*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	**48.80**	*V*	*Output Rectifier Maximum Peak Inverse Voltage*
ISP	**0.601**	*A*	*Peak Secondary Current*
ISRMS	**0.324**	*A*	*Secondary RMS Current*
ISRMS_WINDING	**0.972**	*A*	*Secondary Winding RMS Current*
CMAS	**622**	*Cmils/A*	*Secondary Winding Current Capacity*
RTH_RECTIFIER	**424.97**	*°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	**0.255**	*A*	*Output Capacitor - RMS Ripple Current*
Expected Lifetime	**24309**	*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



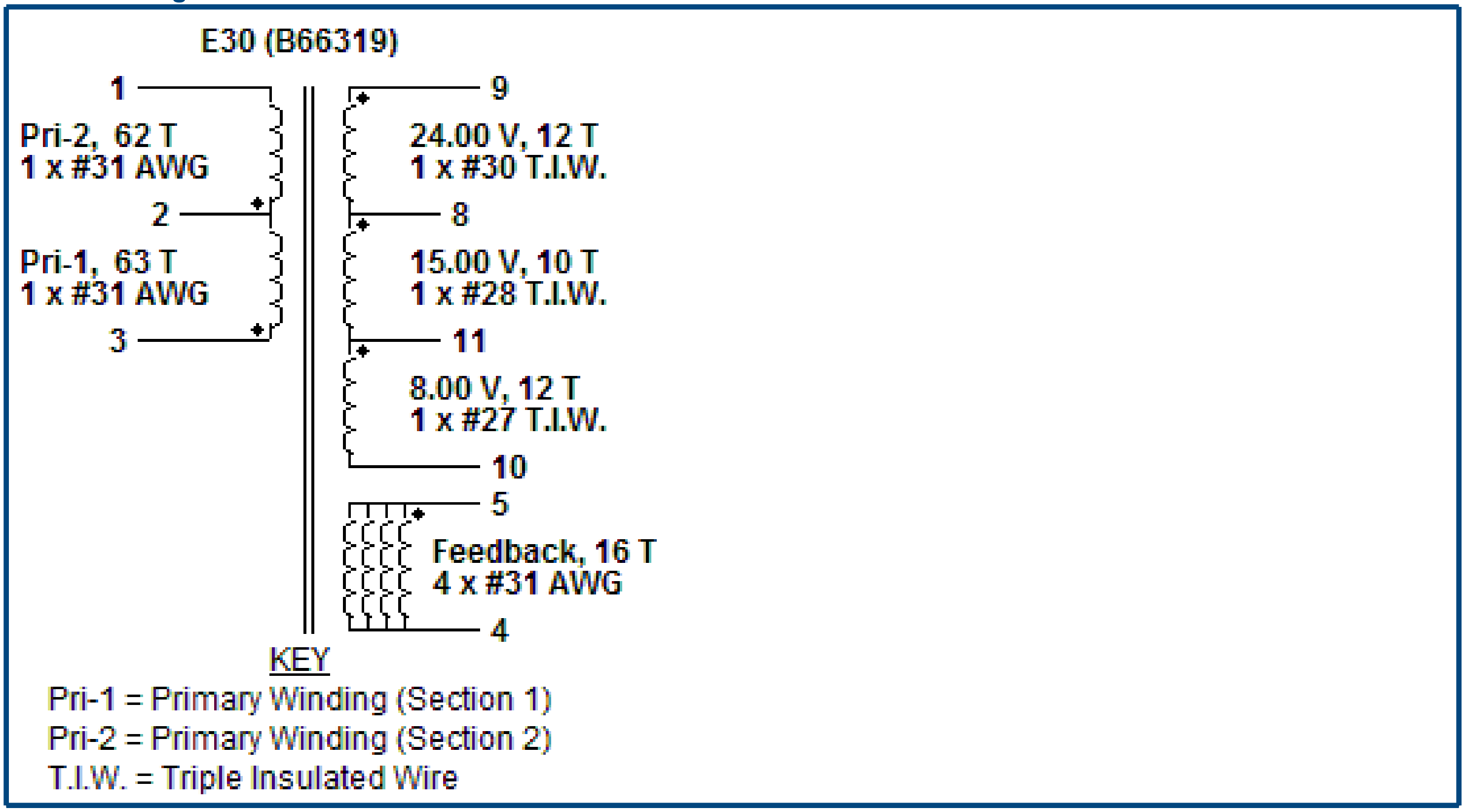
Click on the "Show me" icon to highlight relevant areas on the sample layout.		
	Description	*Show Me*
1	*Minimize loop area formed by drain, input capacitor and transformer*	
2	*Minimize loop area formed by secondary winding, the output rectifier and the output filter capacitor*	
3	*Minimize the loop 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

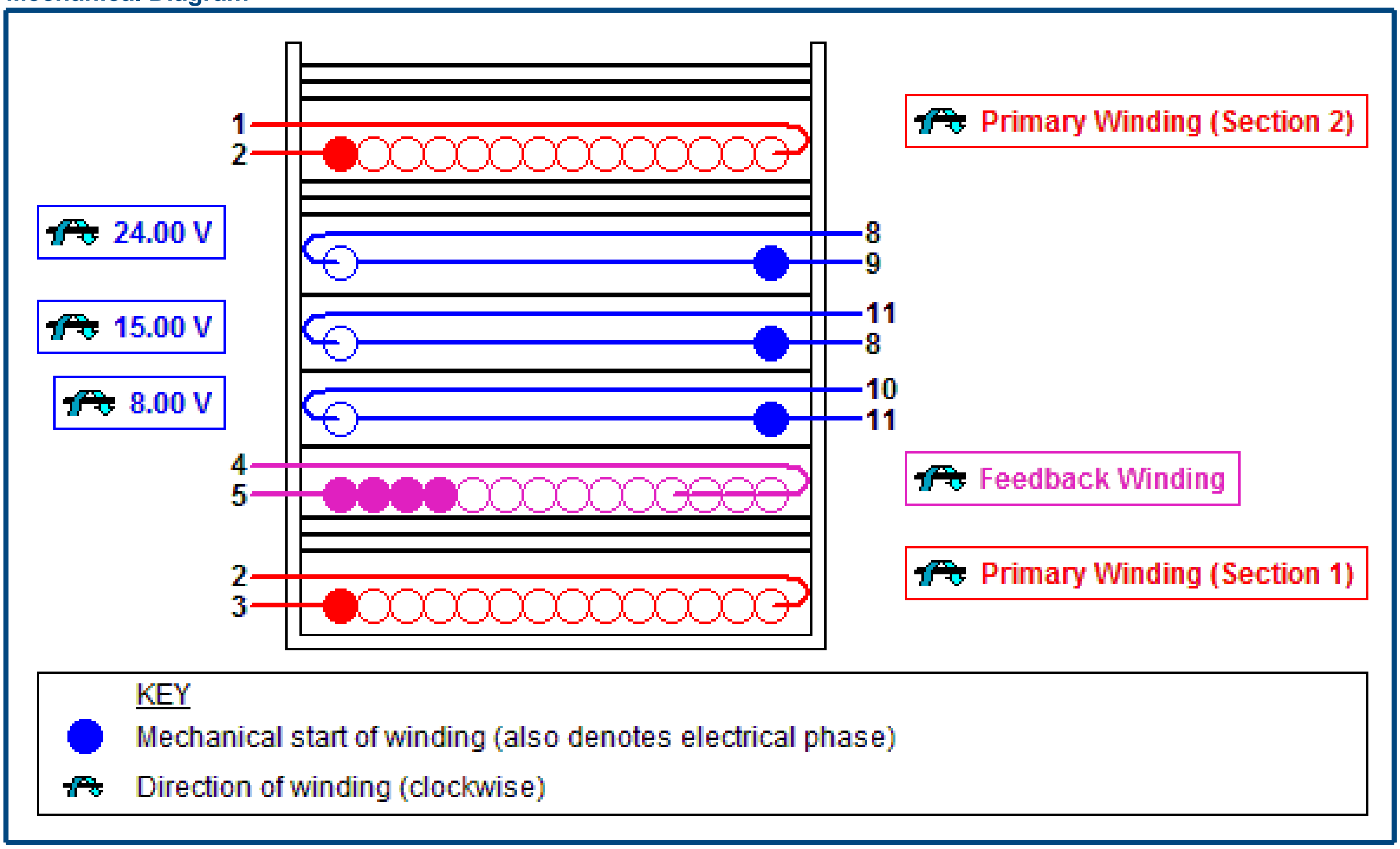
Item #	Quantity	Part Ref	Value	Description	Mfg	Mfg Part Number
1	1	C1	2.2 µF	2.2 µF, 450 V, High Voltage Al Electrolytic, (13.5 mm x 10 mm)	Panasonic	EEV-EB2W2R2Q
2	1	C2	0.68 nF	0.68 nF, 1 kV, High Voltage Ceramic	Kemet	C1206C681KDRACTU
3	1	C3	100 nF	100 nF, 16 V, Ceramic, X7R	AVX Corp	0603YC104K4T4A
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	27 pF	27 pF, 1 kV, High Voltage Ceramic	Murata	GRM31A5C3A270JW01D
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	47 µF	47 µF, 25 V, Electrolytic, Super Low ESR, 300 mΩ, (11 mm x 5 mm)	United Chemi-Con	EKZE250ELL470ME11D
15	1	C15	56 µF	56 µF, 35 V, Electrolytic, Super Low ESR, 130 mΩ, (11 mm x 6.3 mm)	United Chemi-Con	EKZE350ELL560MF11D
16	1	C16	100 µF	100 µF, 35 V, Electrolytic, Low ESR, 80 mΩ, (10.2 mm x 8 mm)	Panasonic	EEE-FP1V101AP
17	1	D1	RGF1M	1000 V, 1 A, Fast Recovery, 500 ns, DO-214AC	ON Semiconductor	RGF1M
18	1	D2	LL4148-M-08	100 V, 0.15 A, Fast Recovery, 8 ns, SOD-80	Vishay	LL4148-M-08
19	1	D3	B160B-13-F	60 V, 1 A, Schottky, DO-214AA	Diodes Inc.	B160B-13-F
20	2	D4, D5	CRH02(TE85L, Q,M)	200 V, 0.5 A, Ultrafast Recovery, 35 ns, TO-220-3F	Toshiba	CRH02(TE85L,Q,M)
21	2	L1, L2	3.3 µH	3.3 µH, 2.6 A	Murata	LQH66SN3R3M03L
22	2	R1, R2	18 kΩ	18 kΩ, 5 %, 0.5 W, Thick Film	Generic	
23	1	R3	33 Ω	33 Ω, 5 %, 0.25 W, Thick Film	Generic	
24	1	R4	100 kΩ	100 kΩ, 1 %, 0.25 W, Thick Film	Generic	
25	1	R5	124 kΩ	124 kΩ, 1 %, 0.125 W, Thick Film	Generic	
26	1	R6	2 Ω	2 Ω, 5 %, 0.125 W, Thick Film	Generic	
27	1	R7	22 Ω	22 Ω, 5 %, 0.25 W, Thick Film	Generic	
28	1	R8	390 Ω	390 Ω, 5 %, 0.25 W, Thick Film	Generic	
29	1	R9	470 Ω	470 Ω, 5 %, 0.25 W, Thick Film	Generic	
30	1	R10	3.3 kΩ	3.3 kΩ, 5 %, 0.125 W, Thick Film	Generic	
31	1	R11	54.9 kΩ	54.9 kΩ, 1 %, 0.25 W, Thick Film	Generic	
32	1	R12	12.1 kΩ	12.1 kΩ, 1 %, 0.125 W, Thick Film	Generic	

33	1	RF1	10 Ω	10 Ω, 2 W, Flameproof Wire-Wound Resistor	Bourns Inc.	FW20A10R0JA
34	1	T1	E30 (B66319)	3F3 Core Material See Transformer Construction's Materials List for complete information	EPCOS (TDK)	B66319
35	1	T1 Bobbin	E30/15/7 - 1 (P7-S7)	Bobbin Material : GFR polyterephthalate	EPCOS (TDK)	B66232
36	1	T1 Core Acc.1	B66232	Yoke . Stainless spring steel (0.4mm)	EPCOS (TDK)	B66232
37	1	T1 Core Acc.2	CLA-E30/15/7	Clasp . CuZn Alloy, Ni plated	Ferroxcube	CLA-E30/15/7
38	1	T1 Core Acc.3	SPR-E30/15/7	Spring . Stainless steel (CrNi)	Ferroxcube	SPR-E30/15/7
39	1	U1	LNK6763K	LinkSwitch-HP, LNK6763K, eSOP-12B	Power Integrations	LNK6763K
40	1	VR1	P6SMB110A-E3 /52	110 V, 5 W, 5 %, DO-214AA, TVS	Vishay	P6SMB110A-E3/52
41	1			52 mm² area on Copper PCB. 2 oz (70 µm) thickness. Heatsink for use with Rectifier D3.	Custom	
42	1			52 mm² area on Copper PCB. 2 oz (70 µm) thickness. Heatsink for use with Rectifier D4.	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	

Electrical Diagram



Mechanical Diagram



Winding Instruction

Primary Winding (Section 1)

Start on pin(s) 3 and wind 63 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 16 turns (x 4 filar) of item [5]. 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) 11 and wind 12 turns (x 1 filar) of item [6]. 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) 8 and wind 10 turns (x 1 filar) of item [7]. Spread the winding evenly across entire bobbin. Winding direction is clockwise. Finish this winding on pin(s) 11.

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

Primary Winding (Section 2)

Start on pin(s) 2 and wind 62 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 132 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: 31 AWG (0.22 mm), Solderable Double Coated**
[6]	**Triple Insulated Wire: 27 AWG (0.35 mm)**
[7]	**Triple Insulated Wire: 28 AWG (0.32 mm)**
[8]	**Triple Insulated Wire: 30 AWG (0.25 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.**	**2030**
Tolerance, ±%	**Tolerance of Primary Inductance**	**10.0**
Maximum Primary Leakage, µH	**Measured between Pin 1 to Pin 3, with all other Windings shorted.**	**20.30**

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.

	Description	Fix	Ref. #
	The clamp safety margin is lower than 40V.	Reduce the design VOR, VC_GOAL or pick a device with a higher BVDSS	652
	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
	Fusible Resistor is used.	Make sure to use a wire-wound, flameproof, fusible resistor for RF1.	165