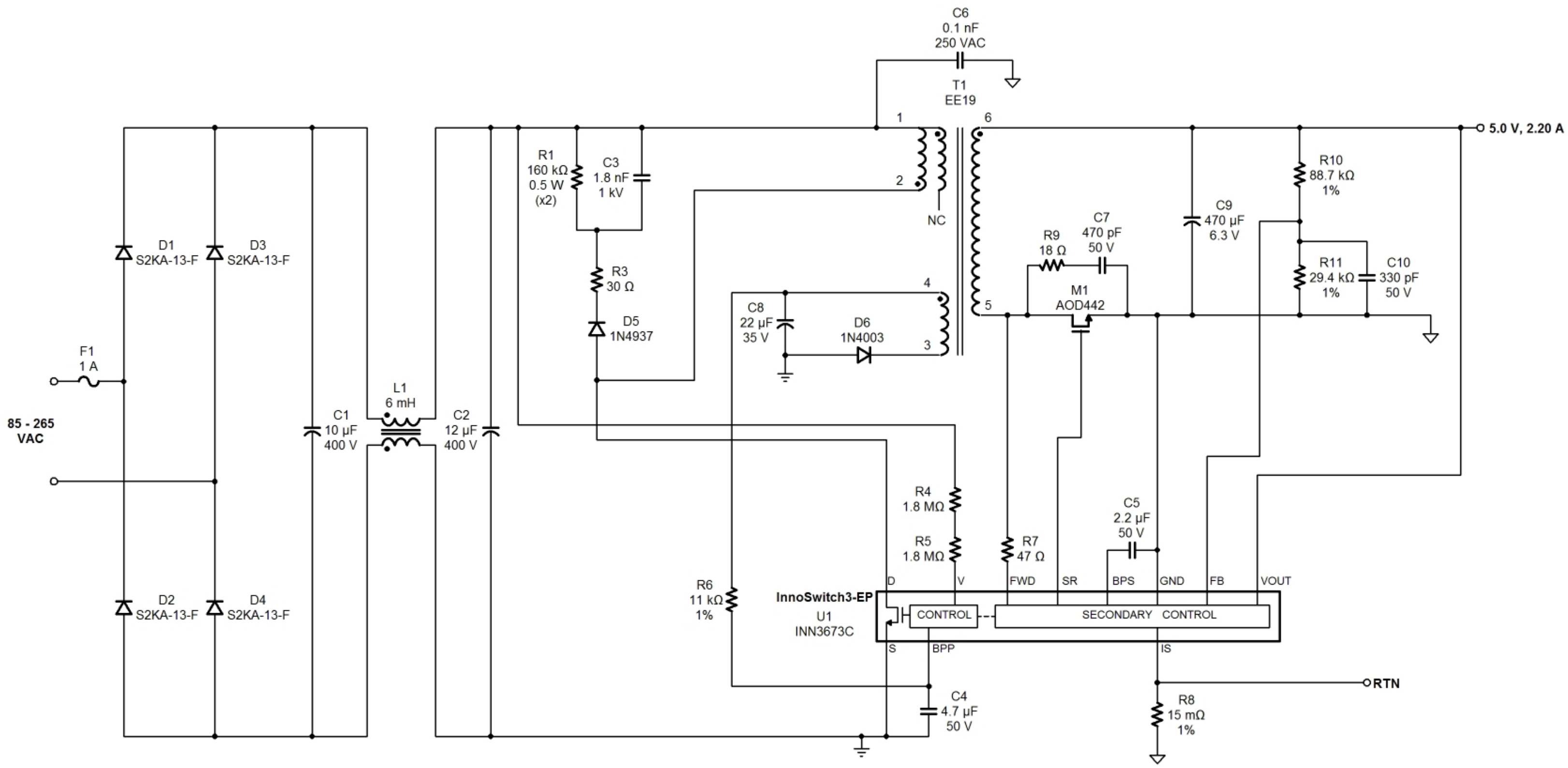

C6
0.1 nF
250 VAC
T1
EE19
5.0 V, 2.20 A
85 - 265
VAC
F1
1 A
D1
S2KA-13-F
D3
S2KA-13-F
D2
S2KA-13-F
D4
S2KA-13-F
C1
10 µF
400 V
L1
6 mH
C2
12 µF
400 V
R1
160 kΩ
0.5 W
(x2)
C3
1.8 nF
1 kV
R3
30 Ω
D5
1N4937
NC
C8
22 µF
35 V
D6
1N4003
R9
18 Ω
C7
470 pF
50 V
M1
AOD442
C9
470 µF
6.3 V
R10
88.7 kΩ
1%
R11
29.4 kΩ
1%
C10
330 pF
50 V
R4
1.8 MΩ
R5
1.8 MΩ
R7
47 Ω
C5
2.2 µF
50 V
R6
11 kΩ
1%
InnoSwitch3-EP
U1
INN3673C
D
V
FWD
SR
BPS
GND
FB
VOUT
CONTROL
SECONDARY CONTROL
S
BPP
IS
RTN
C4
4.7 µF
50 V
R8
15 mΩ
1%

Power Supply Input

Var	Value	Units	Description
VACMIN	85	V	Minimum Input AC Voltage
VACNOM	115	V	Nominal AC Voltage (For universal designs low line nominal voltage is displayed)
VACMAX	265	V	Maximum Input AC Voltage
FL	50	Hz	Line Frequency
η	86.0	%	Efficiency Estimate (Target)
TC	2.71	ms	Input Rectifier Conduction Time
Z	0.51		Loss Allocation Factor
VMIN	77.3	V	Minimum DC Input Voltage
VMAX	374.8	V	Maximum DC Input Voltage
ENCLOSURE	Adapter		Enclosure
TAMB	60	°C	Maximum Operating Ambient air Temperature

Input Section

Var	Value	Units	Description
Fuse	1.00	A	Input Fuse Rated Current
IAVG	0.16	A	Average Diode Bridge Current (DC Input Current)

Device Variables

Var	Value	Units	Description
Device	INN3673C		PI Device Name
Current Limit Mode	Increased		Device Current Limit Mode
BVDSS	725	V	Drn-Src Bkdn Voltage
ILIMITMIN	0.591	A	Minimum Current Limit
ILIMITTYP	0.650	A	Typical Current Limit
ILIMITMAX	0.709	A	Maximum Current Limit
RDSON	6.85	Ω	PI Device RDSON (100°C)
RDSON_25C	4.42	Ω	PI Device RDSON (25°C)
PO	11.00	W	Total Output Power
VDRAIN Estimated	541.26	V	Estimated Drain Voltage
VOR	67.6	V	Reflected Output Voltage
VDS	3.64	V	On state Drain to Source Voltage
FS	80225	Hz	Switching Frequency (at VMIN and Full Load)
FS_NOM	62243	Hz	Nominal Operating Switching Frequency (at Full Load)
KP	0.83		Continuous/Discontinuous Operating Ratio (at VMIN and full load)
DMAX	0.48		Maximum Duty Cycle (at VMIN and full load)
TIME_OFF	6.5	μs	Expected Device Off-time (at VMIN and Full Load)
TIME_ON	6.0	μs	Expected Device On-time (at VMIN and Full Load)
IP	0.58	A	Peak Primary Current (at VMIN and full load)
IR	0.48	A	Primary Ripple Current (at VMIN and full load)
IRMS	0.25	A	Primary RMS Current (at VMIN and full load)
UVOV_PRIORITY	Overvoltage		Input Undervoltage/Overvoltage Priority type
RTH_DEVICE	96.29	°C/W	PI Device Heatsink Maximum Thermal Resistance
DEV_HSINK_TYPE	2 Oz (70 μ) 2-Sided Copper		PI Device Heatsink Type
DEV_HSINK_AREA	104	mm²	PI Device Heatsink Area

Clamp Circuit

Var	Value	Units	Description
Clamp Type	**RCD Clamp**		Clamp Circuit Type
VCLAMP	**99**	V	Average Clamping Voltage
VC_MARGIN	**182.65**	V	Clamp Voltage Safety Margin

Bias Variables

Var	Value	Units	Description
VB	**12.0**	V	Bias Voltage
VBMIN	**9.6**	V	Minimum Bias Voltage
VBMAX	**24.0**	V	Maximum Bias Voltage
Use Linear Regulator	**NO**		Use Linear Regulator Circuit
PIVB	**87**	V	Bias Rectifier Maximum Peak Inverse Voltage
NB	**19**		Bias Winding Number of Turns

Transformer Construction Parameters

Var	Value	Units	Description
Core Type	**EE19**		Core Type
Core Material	**PC95**		Core Material
Bobbin Reference	**Generic, 4 pri. + 5 sec.**		Bobbin Reference
Bobbin Orientation	**Vertical**		Bobbin type
Primary Pins	**4**		Number of Primary pins used
Secondary Pins	**2**		Number of Secondary pins used
USE_SHIELDS	**YES**		Use shield Windings
LP_nom	**1021**	µH	Nominal Primary Inductance
LP_Tol	**10.0**	%	Primary Inductance Tolerance
NP	**94.6**		Calculated Primary Winding Total Number of Turns
NSM	**7**		Secondary Main Number of Turns
Primary Current Density	**6**	A/mm²	Primary Winding Current Density
BW	**9.00**	mm	Bobbin Winding Width
ML	**0.00**	mm	Safety Margin on Left Width
MR	**0.00**	mm	Safety Margin on Right Width
FF	**88**	%	Actual Transformer Fit Factor. 100% signifies fully utilized winding window
AE	**23.00**	mm²	Core Cross Sectional Area
ALG	**114**	nH/T²	Gapped Core Specific Inductance
BM	**271**	mT	Maximum Flux Density
BP	**366**	mT	Peak Flux Density
BAC	**112**	mT	AC Flux Density for Core Loss
LG	**0.230**	mm	Estimated Gap Length
L_LKG	**30.63**	µH	Estimated primary leakage inductance
LSEC	**15**	nH	Secondary Trace Inductance

Primary Winding Section 1

Var	Value	Units	Description
NP1	**95**		Number of Primary Winding Turns in the First Section of Primary
Wire Size	**0.22**	mm	Primary Wire Inner Diameter Actual
Winding Type	**Single (x1)**		Primary Winding - Number of Parallel Wire Strands

L	2.82		Primary Winding - Number of Layers

Output 1

Var	Value	Units	Description
VO	5.00	V	Typical Output Voltage
IO	2.20	A	Output Current
VOUT_ACTUAL	5.00	V	Actual Output Voltage
Cable Drop Compensation	0	mV	Cable Drop Compensation
NS	7		Secondary Number of Turns
Wire Size	0.45	mm	Secondary Wire Inner Diameter Actual
Winding Type	Bifilar (x2)		Output winding number of parallel strands
L_S_OUT	1.01		Secondary Output Winding Layers
PIVS	33	V	Output Rectifier Maximum Peak Inverse Voltage
ISP	7.80	A	Peak Secondary Current
ISRMS	3.57	A	Secondary RMS Current
RTH_RECTIFIER	81.32	°C/W	Output Rectifier Heatsink Maximum Thermal Resistance
OR_HSINK_TYPE	2 Oz (70 μ) 2-Sided Copper		Output Rectifier Heatsink Type
OR_HSINK_AREA	104	mm^2	Output Rectifier Heatsink Area
OSR_RDSON	25.00	mΩ	Synchronous Rectifier RDSON
CO	470 x 1	μF	Output Capacitor - Capacitance
IRIPPLE	2.81	A	Output Capacitor - RMS Ripple Current
Expected Lifetime	62490	hr	Output Capacitor - Expected Lifetime

Feedback Circuit

Var	Value	Units	Description
DUAL_OUTPUT_FB_FLAG	NO		Get feedback from 2 outputs

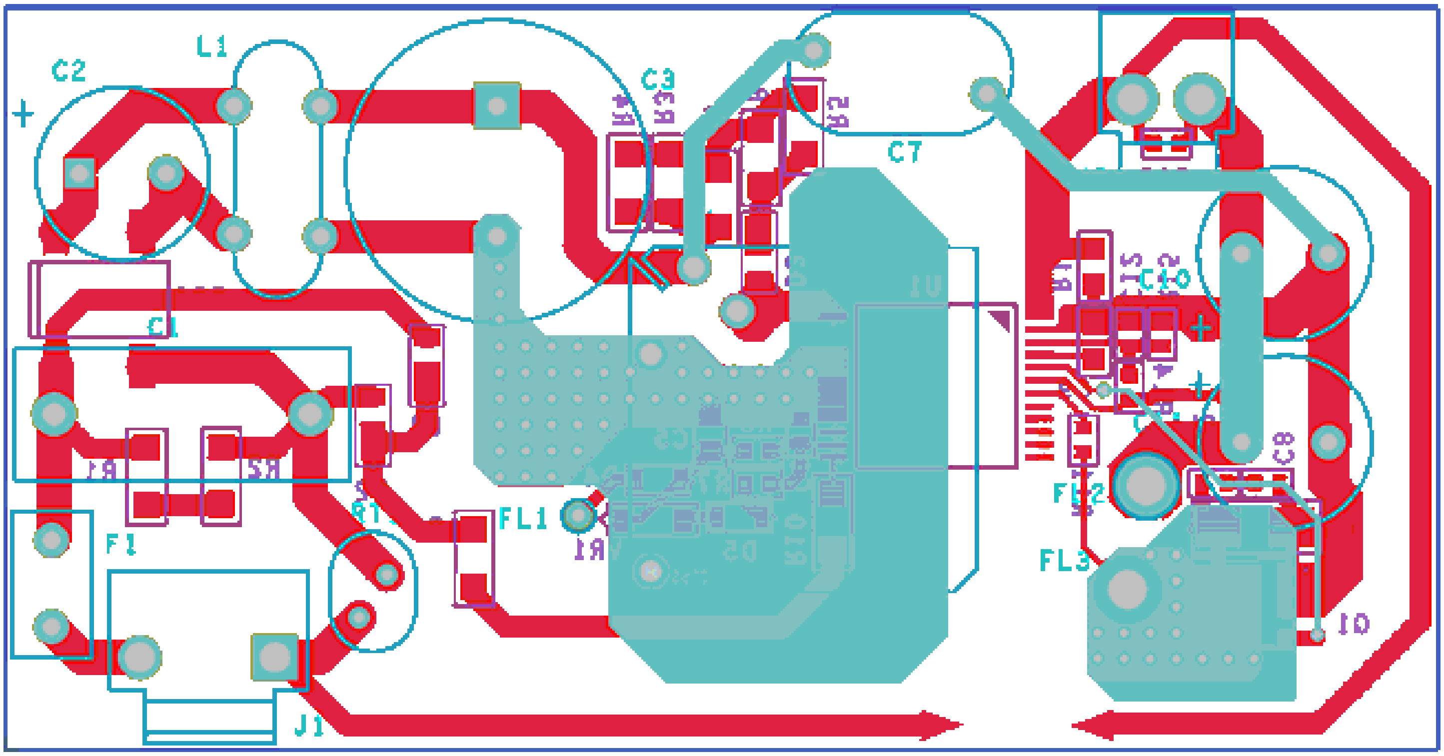
Power Supply Efficiency and Losses (at VACMIN - VACNOM and Full Load)

Var	Value	Units	Description
N_ACTUAL_RANGE	79.6 - 83.6	%	Calculated Efficiency
TOTAL_LOSS_RANGE	2.16 - 2.82	W	Total Power Supply Losses
Device Circuit Losses	0.40 - 0.64	W	Total Device Circuit Losses
TRF_LOSS_RANGE	0.49 - 0.63	W	Total Transformer Losses
INSTAGE_LOSS_RANGE	0.70 - 0.99	W	Total Primary Side Losses
OUTSTAGE_LOSS_RANGE	0.56 - 0.57	W	Total Secondary Side Losses

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



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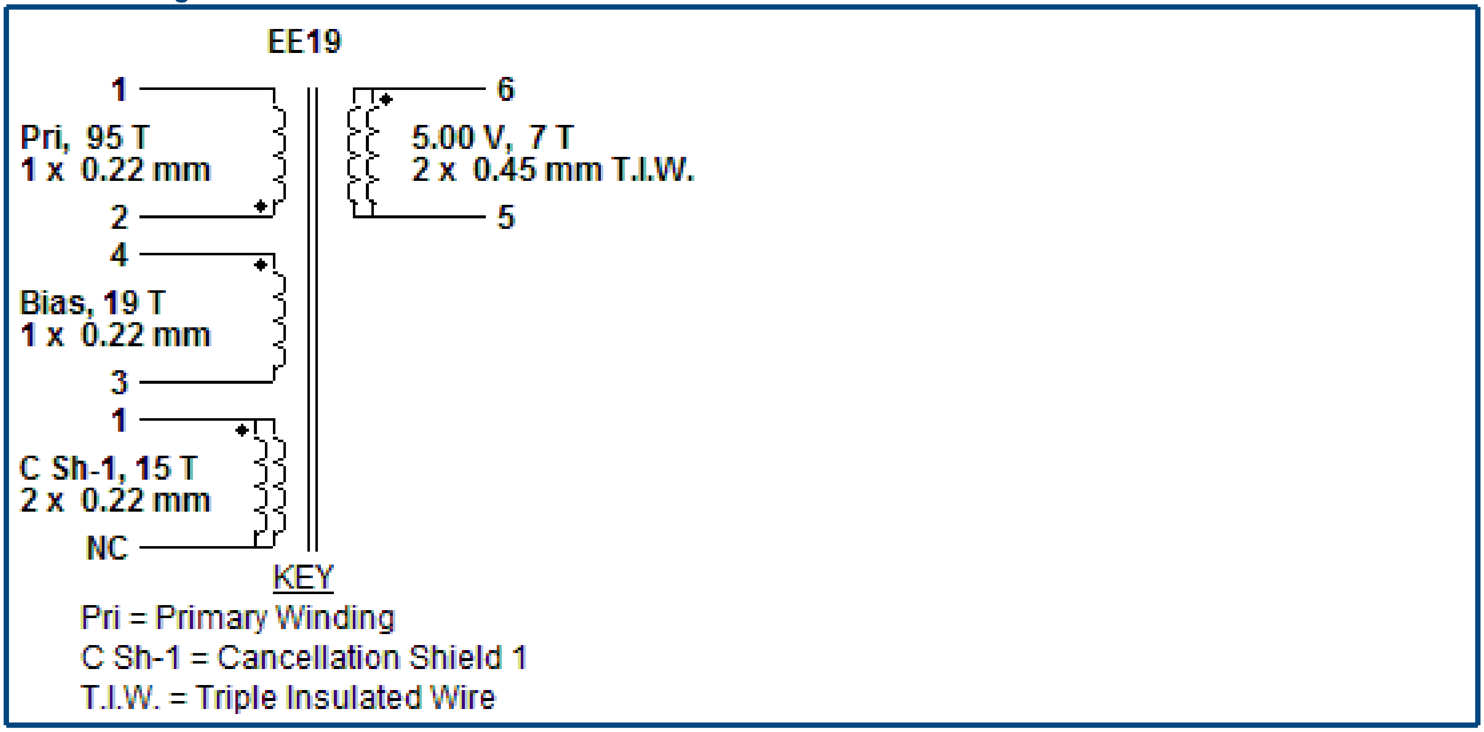
Click on the "Show me" icon to highlight relevant areas on the sample layout.

	Description	*Show Me*
1	*Minimize loop area formed by secondary winding, the output rectifier and the output filter capacitor*	
2	*Y-capacitor connected directly to the DC pin of the primary and secondary GND*	
3	*Minimize loop area formed by drain, clamp and transformer*	
4	*Maximize hatched area for heat-sinking*	
5	*Minimize loop area formed by drain, input capacitor and transformer*	
6	*Spark gaps with adequate creepage help in steering away the destructive energy created during an ESD event through the protection components such as the Y-cap.*	
7	*The BYPASS pin capacitor should be located as close as possible to the BYPASS and SOURCE pins*	

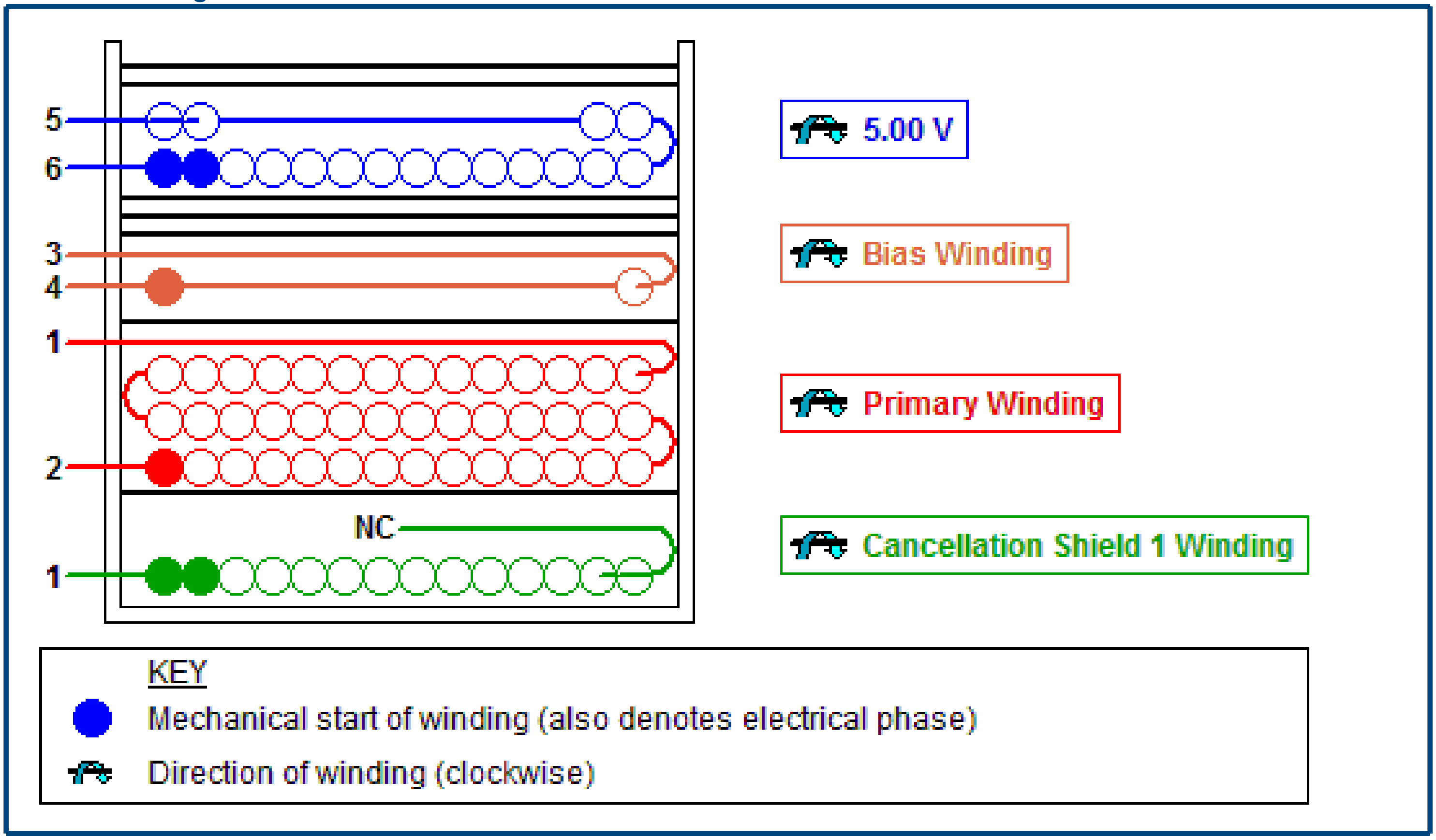
Bill Of Materials

Item #	Quantity	Part Ref	Value	Description	Mfg	Mfg Part Number
1	1	C1	10 µF	10 µF, 400 V, High Voltage Al Electrolytic, (20 mm x 10 mm)	United Chemi-Con	EKMX400VB10RM10X20LL
2	1	C2	12 µF	12 µF, 400 V, High Voltage Al Electrolytic, (17.5 mm x 10 mm)	Rubycon	400BXF12MCT10X16
3	1	C3	1.8 nF	1.8 nF, 1 kV, High Voltage Ceramic	Panasonic	ECK-D3A182KBN
4	1	C4	4.7 µF	4.7 µF, 50 V, Ceramic, X7R	AVX Corp	SE035C475KAR
5	1	C5	2.2 µF	2.2 µF, 50 V, Ceramic, X7R	Murata	RDER71H225K2K1C03B
6	1	C6	0.1 nF	0.1 nF, 250 VAC, Ceramic, Y Class	Vishay Cera-Mite	440LT10-R
7	1	C7	470 pF	470 pF, 50 V, Ceramic, C0G	TDK	FK18C0G1H471J
8	1	C8	22 µF	22 µF, 35 V, Electrolytic, Gen Purpose, 17 mΩ, (8 mm x 6.3 mm)	Rubycon	35MH722MEFCTZ6.3X7
9	1	C9	470 µF	470 µF, 6.3 V, Al Organic Polymer, 8 mΩ, (8 mm x 6.3 mm)	United Chemi-Con	APSE6R3ELL471MF08S
10	1	C10	330 pF	330 pF, 50 V, Ceramic, C0G	TDK	FK18C0G1H331J
11	4	D1, D2, D3, D4	S2KA-13-F	800 V, 1.5 A, Standard Recovery, DO-214AC(SMA)	Diodes Inc.	S2KA-13-F
12	1	D5	1N4937	600 V, 1 A, Fast Recovery, 200 ns, DO-41	Vishay	1N4937
13	1	D6	1N4003	200 V, 1 A, Standard Recovery, DO-41	Vishay	1N4003
14	1	F1	1 A	250 VAC, 1 A, Radial TR5, Time Lag Fuse	Littelfuse / Wickmann(R)	37411000410
15	1	L1	6 mH	6 mH, 1.6 A	Panasonic	ELF18N016
16	1	M1	AOD442	MOSFET, N-Channel, 60 V, 5 A, D-PAK	Alpha & Omega Semiconductor Inc.	AOD442
17	2	R1, R2	160 kΩ	160 kΩ, 5 %, 0.5 W, Carbon Film	Generic	
18	1	R3	30 Ω	30 Ω, 5 %, 0.25 W, Carbon Film	Generic	
19	2	R4, R5	1.8 MΩ	1.8 MΩ, 5 %, 0.25 W, Carbon Film	Generic	
20	1	R6	11 kΩ	11 kΩ, 1 %, 0.125 W, Metal Film	Generic	
21	1	R7	47 Ω	47 Ω, 5 %, 0.125 W, Carbon Film	Generic	
22	1	R8	15 mΩ	15 mΩ, 1 %, 0.25 W, Metal Film	Generic	
23	1	R9	18 Ω	18 Ω, 5 %, 0.25 W, Carbon Film	Generic	
24	1	R10	88.7 kΩ	88.7 kΩ, 1 %, 0.125 W, Metal Film	Generic	
25	1	R11	29.4 kΩ	29.4 kΩ, 1 %, 0.125 W, Metal Film	Generic	
26	1	T1	EE19	PC95 Core Material See Transformer Construction’s Materials List for complete information	TDK	PC40EE19-Z
27	1	U1	INN3673C	InnoSwitch3-EP, INN3673C, inSOP-24D	Power Integrations	INN3673C-H601
28	1			104 mm² area on Copper PCB. 2 oz (70 µm) thickness. Heatsink for use with Device U1.	Custom	
29	1			104 mm² area on Copper PCB. 2 oz (70 µm) thickness. Heatsink for use with Rectifier M1.	Custom	

Electrical Diagram



Mechanical Diagram



Winding Instruction

Cancellation Shield 1 Winding

Start on pin(s) 1 and wind 15 turns (x 2 filar) of item [5] from left to right in exactly 1 layer. Winding direction is clockwise. Leave this end of cancellation shield winding not connected. Bend the end 90 deg and cut the wire in the middle of the bobbin.

Add 1 layer of tape, item [3], to secure the winding in place.

Primary Winding

Start on pin(s) 2 and wind 95 turns (x 1 filar) of item [5]. in 3 layer(s) from left to right. Winding direction is clockwise. At the end of 1st layer, continue to wind the next layer from right to left. At the end of 2nd layer, continue to wind the next layer from left to right. On the final layer, spread the winding evenly across entire bobbin. Finish this winding on pin(s) 1.

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

Bias Winding

Start on pin(s) 4 and wind 19 turns (x 1 filar) of item [5]. Winding direction is clockwise. Spread the winding evenly across entire bobbin. Finish this winding on pin(s) 3.

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

Secondary Winding

Start on pin(s) 6 and wind 7 turns (x 2 filar) of item [6]. Spread the winding evenly across entire bobbin. Winding direction is clockwise. Finish this winding on pin(s) 5.

Add 2 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. For non margin wound transformers use triple insulated wire for all secondary windings.

Materials

Item	*Description*
[1]	Core: EE19, PC95, gapped for ALG of 114 nH/T²
[2]	Bobbin: Generic, 4 pri. + 5 sec.
[3]	Barrier Tape: Polyester film [1 mil (25 µm) base thickness], 9.00 mm wide
[4]	Varnish
[5]	Magnet Wire: 0.22 mm, Solderable Double Coated
[6]	Triple Insulated Wire: 0.45 mm

Electrical Test Specifications

Parameter	*Condition*	*Spec*
Electrical Strength, VAC	**60 Hz 1 second, from pins 1,2,3,4 to pins 5,6.**	**3000**
Nominal Primary Inductance, µH	**Measured at 1 V pk-pk, typical switching frequency, between pin 1 to pin 2, with all other Windings open.**	**1021**
Tolerance, ±%	**Tolerance of Primary Inductance**	**10.0**
Maximum Primary Leakage, µH	**Measured between Pin 1 to Pin 2, with all other Windings shorted.**	**30.63**

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.