

1	ACDC_TOPSwitchJX_062521; Rev.2.1; Copyright Power Integrations 2021	INPUT	INFO	OUTPUT	UNITS	TOPSwitch-JX Flyback Design Spreadsheet
2	Application Variables					Design Title
3	VAC_RANGE			Universal		Input voltage range
4	VAC_MIN			85 V		Minimum input RMS voltage
5	VAC_MAX			265 V		Maximum input RMS voltage
6	FL			50 Hz		Line frequency
7	VOUT	24.00		24.00 V		Output voltage
8	IOUT			5.00 A		Output current
9	POUT	120.0		120.0 W		Output power
10	POUT_PEAK			120.0 W		Peak output power
11	EFFICIENCY_ACDC	0.86		0.86		AC-DC efficiency
12	FACTOR_Z			0.50		Z-factor
13						
14						
15	Input Side Components					
16	Input Capacitor					
17	CIN	470.0		470.0 uF		Input capacitance
18	VF_BRIDGEDIODE			0.70 V		Input bridge diode forward voltage
19	VAC_MIN_VLY			98.3 V		Valley of the rectified minimum input AC voltage when delivering POUT. During peak power delivery, the valley of the rectified minimum input AC voltage is 98.3V
20						
21	V-Pin					
22	UVOV TYPE	UVOV		UVOV		Standard under-voltage and over-voltage. Refer to page.13 of the TopSwitch-JX spreadsheet
23	UNDERVOLTAGE			62.5 - 78.6 V		Actual RMS under-voltage range
24	OVERVOLTAGE			301.7 - 337 V		Actual RMS over-voltage range
25	RLS1			4.02 MΩ		1% resistor connected from the rectified line voltage to the V-pin
26	RLS2			NA kΩ		Not required
27						
28	X-Pin					
29	KI	1.1		0.9 - 1.1		Typical current limit reduction factor target
30	ILIMIT_KI_RANGE			4.327 - 6.085 A		Minimum current limit based on KI
31	RIL			6.98 kΩ		Current limit programming resistor (1%) connected to the X-pin. Refer to page.31 of the TOPSwitch-JX datasheet
32	RPL			NA MΩ		Power limiting resistor (1%) connected from the rectified input voltage to the X-pin. Refer to page.14 of the TOPSwitch-JX datasheet
33						
34	Bias Winding					
35	VBIAS			12.00 V		Target rectified bias winding voltage at low-load
36	VF_BIAS			0.70 V		Bias winding rectifier diode on-time voltage drop
37	VBIAS_OVP			18.00 V		Target rectified bias winding voltage to trigger output over-voltage
38	VZ_OVP			16.00 V		Zener voltage (1%) required for bias winding sensed output over-voltage. Refer to fig.15 in the TOPSwitch-JX datasheet
39	R_OVP			3.74 kΩ		Resistor (1%) required for bias winding sensed output over-voltage. Refer to fig.15 in the TOPSwitch-JX datasheet
40						
41						
42	TOPSwitch-JX					
43	PACKAGE	eSIP-7C		eSIP-7C		TOPSwitch Package
44	HEATSINK	Metal		Metal		TOPSwitch Heatsink
45	ENCLOSURE	Open Frame		Open Frame		Power supply enclosure
46	MODE_FREQUENCY	F		F		Frequency operation mode (F=132kHz, H=66kHz)
47	DEVICE	TOP271		TOP271EG		TOPSwitch device
48	PMAX			177 W		TOPSwitch device maximum power capability
49	ILIMIT_MIN			4.808 A		Minimum TOPSwitch current limit
50	ILIMIT_MAX			5.532 A		Maximum TOPSwitch current limit
51	VDSOFF			2.435 V		TOPSwitch on-time drain to source voltage
52	VDSOFF			553.4 V		TOPSwitch off-time drain to source voltage
53						
54						
55	Electrical Parameters (Worst Case)					
56	KP			0.752		Measure of continuous/discontinuous mode of operation. The actual KP calculated based on tolerance may be lower than the value entered
57	DUTY			0.575		Primary switch duty cycle
58	IAVG_PRI			1.353 A		Primary switch average current
59	IPK_PRI			4.261 A		Primary switch peak current
60	IRMS_PRI			1.970 A		Primary Switch RMS current
61	IRIPPLE_PRI			4.238 A		Primary Switch ripple current
62	IPK_SEC			22.726 A		Secondary rectifier peak current
63	IRMS_SEC			9.025 A		Secondary winding RMS current
64						
65						
66	Transformer					
67	LP_TYP			127.8 uH		Typical primary magnetizing inductance
68	LP_RANGE			121.4 - 134.2 uH		Range of primary magnetizing inductance to ensure power delivery

69	LP_TOL			5.0%	Magnetizing inductance tolerance
70	VOR	130.0		130.0 V	Secondary winding voltage reflected to the primary winding
71					
72	Core/Bobbin Selection				
73	CORE	PQ32/20		PQ32/20	Transformer core selection - refer to the Transformer Parameters tab to verify fit
74	CORE CODE			B65879A0000R095	Core code
75	AE			154.2 mm ²	Core cross sectional area
76	LE			48.4 mm	Core magnetic path length
77	AL			7600 nH/turns ²	Ungapped core effective inductance
78	VE			7460 mm ³	Core volume
79	BOBBIN			B65880E0012D001	Bobbin
80	AW			47.00 mm ²	Window area of the bobbin
81	BW			9.10 mm	Bobbin width
82	MARGIN			0.00 mm	Safety margin width (Half the primary to secondary creepage distance)
83					
84	Winding Parameters				
85	NP			16	Primary winding number of turns
86	NB			2	Bias winding number of turns
87	NS			3	Secondary winding number of turns
88	BPEAK			0.3310 T	Transformer core's peak flux density
89	BMAX			0.2219 T	Transformer core's operating flux density
90	BAC			0.0940 T	Transformer core AC flux density (0.5 x Peak-Peak)
91	ALG			499.3 nH/turns ²	Gapped core effective inductance (Typical)
92	LG			0.36 mm	Core gap length
93					
94					
95	Output Stage				
96	Output 1				
97	VOUT1			24.00	Output voltage
98	IOUT1			5.00	Output current
99	POUT1			120.00	Output power
100	IRMS_SEC1			9.025	Secondary winding RMS current
101	IRIPPLE_COUT1			7.513	Output capacitor ripple current
102	NS1			3	Secondary winding number of turns
103	VDSOFF_DIODE1			94.0	Output rectifier off-time voltage stress (not incl. the parasitic ring)
104	PN_DIODE1			SBR10150	Suggested output rectifier schottky diode
105	VRRM_DIODE1			150	Output rectifier rated reverse repetitive voltage
106	VF_DIODE1			0.92	Output rectifier rated on-time voltage drop
107	IF_DIODE1			10.0	Output rectifier rated average forward current
108					
109	Output 2				
110	VOUT2				Output voltage
111	IOUT2				Output current
112	POUT2				Output power
113	IRMS_SEC2				Secondary winding RMS current
114	IRIPPLE_COUT2				Output capacitor ripple current
115	NS2				Secondary winding number of turns
116	VDSOFF_DIODE2				Output rectifier off-time voltage stress (not incl. the parasitic ring)
117	PN_DIODE2				Suggested output rectifier schottky diode
118	VRRM_DIODE2				Output rectifier rated reverse repetitive voltage
119	VF_DIODE2				Output rectifier rated on-time voltage drop
120	IF_DIODE2				Output rectifier rated average forward current
121					
122	Output 3				
123	VOUT3				Output voltage
124	IOUT3				Output current
125	POUT3				Output power
126	IRMS_SEC3				Secondary winding RMS current
127	IRIPPLE_COUT3				Output capacitor ripple current
128	NS3				Secondary winding number of turns
129	VDSOFF_DIODE3				Output rectifier off-time voltage stress (not incl. the parasitic ring)
130	PN_DIODE3				Suggested output rectifier schottky diode
131	VRRM_DIODE3				Output rectifier rated reverse repetitive voltage
132	VF_DIODE3				Output rectifier rated on-time voltage drop
133	IF_DIODE3				Output rectifier rated average forward current
134					
135	POUT_TOTAL			120	Total output power
136	NEGATIVE OUTPUT	N/A		N/A	Select the negative output voltage index (Eg. Select 3 if you want the 3rd output to be negative)
137					