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		AC-DC efficiency
12	FACTOR_Z			0.50		Z-factor
13						
14						
15	**Input Side Components**					
16	**Input Capacitor**					
17	CIN			240.0	uF	Input capacitance
18	VF_BRIDGEDIODE			0.70	V	Input bridge diode forward voltage
19	VAC_MIN_VLY			77.7	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 77.7V
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			0.805 - 1.022		Typical current limit reduction factor target
30	ILIMIT_KI_RANGE			3.871 - 5.652	A	Minimum current limit based on KI
31	RIL			7.87	kΩ	Current limit programming resistor (1%) connected to the X-pin. Refer to page.31 of the TOPSwitch-JX datasheet
32	RPL			17.800	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	VDSON			3.131	V	TOPSwitch on-time drain to source voltage
52	VDSOFF			563.4	V	TOPSwitch off-time drain to source voltage
53						
54						
55	**Electrical Parameters (Worst Case)**					
56	KP	0.500		0.463		Measure of continuous/discontinuous mode of operation. The actual KP calculated based on tolerance may be lower than the value entered
57	DUTY			0.652		Primary switch duty cycle
58	IAVG_PRI			1.739	A	Primary switch average current
59	IPK_PRI			3.749	A	Primary switch peak current
60	IRMS_PRI			2.212	A	Primary Switch RMS current
61	IRIPPLE_PRI			3.398	A	Primary Switch ripple current
62	IPK_SEC			21.557	A	Secondary rectifier peak current
63	IRMS_SEC			9.284	A	Secondary winding RMS current
64						
65						
66	**Transformer**					
67	LP_TYP			198.8	uH	Typical primary magnetizing inductance
68	LP_RANGE			188.9 - 208.7	uH	Range of primary magnetizing inductance to ensure power delivery
69	LP_TOL			5.0	%	Magnetizing inductance tolerance

70	VOR	**140.0**		140.0	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			23		Primary winding number of turns
86	NB			3		Bias winding number of turns
87	NS			4		Secondary winding number of turns
88	BPEAK			0.3326	T	Transformer core's peak flux density
89	BMAX			0.2146	T	Transformer core's operating flux density
90	BAC			0.0577	T	Transformer core AC flux density (0.5 x Peak-Peak)
91	ALG			375.8	nH/turns^2	Gapped core effective inductance (Typical)
92	LG			0.49	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			9.284		Secondary winding RMS current
101	IRIPPLE_COUT1			7.823		Output capacitor ripple current
102	NS1			4		Secondary winding number of turns
103	VDSOFF_DIODE1			88.9		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						