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	100		100	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			0.67	A	Output current
9	POUT	16.0		16.0	W	Output power
10	POUT_PEAK			16.0	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	47.0		47.0	uF	Input capacitance
18	VF_BRIDGEDIODE			0.70	V	Input bridge diode forward voltage
19	VAC_MIN_VLY			116.9	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 116.9V
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			73.7 - 92.7	V	Actual RMS under-voltage range
24	OVERVOLTAGE			356.4 - 398	V	Actual RMS over-voltage range
25	RLS1			4.75	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	0.61		0.533 - 0.729		Typical current limit reduction factor target
30	ILIMIT_KI_RANGE			0.645 - 1.015	A	Minimum current limit based on KI
31	RIL			11.80	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	Adapter		Adapter		Power supply enclosure
46	MODE_FREQUENCY	F		F		Frequency operation mode (F=132kHz, H=66kHz)
47	DEVICE	TOP264		TOP264EG		TOPSwitch device
48	PMAX			20	W	TOPSwitch device maximum power capability
49	ILIMIT_MIN			1.209	A	Minimum TOPSwitch current limit
50	ILIMIT_MAX			1.391	A	Maximum TOPSwitch current limit
51	VDSON			1.454	V	TOPSwitch on-time drain to source voltage
52	VDSOFF			525.4	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			0.469		Primary switch duty cycle
58	IAVG_PRI			0.150	A	Primary switch average current
59	IPK_PRI			0.579	A	Primary switch peak current
60	IRMS_PRI			0.242	A	Primary Switch RMS current
61	IRIPPLE_PRI			0.576	A	Primary Switch ripple current
62	IPK_SEC			2.399	A	Secondary rectifier peak current
63	IRMS_SEC			1.065	A	Secondary winding RMS current

64						
65						
66	**Transformer**					
67	LP_TYP			922.8	uH	Typical primary magnetizing inductance
68	LP_RANGE			876.7 - 968.9	uH	Range of primary magnetizing inductance to ensure power delivery
69	LP_TOL			5.0	%	Magnetizing inductance tolerance
70	VOR	**102.0**		102.0	V	Secondary winding voltage reflected to the primary winding
71						
72	**Core/Bobbin Selection**					
73	CORE	**Custom**		Custom		Transformer core selection - refer to the Transformer Parameters tab to verify fit
74	CORE CODE	**EFD15**		EFD15		Core code
75	AE	**15.0**		15.0	mm^2	Core cross sectional area
76	LE	**34.0**		34.0	mm	Core magnetic path length
77	AL	**780**		780	nH/turns^2	Ungapped core effective inductance
78	VE	**510**		510	mm^3	Core volume
79	BOBBIN	**efd15**		efd15		Bobbin
80	AW	**65.00**		65.00	mm^2	Window area of the bobbin
81	BW	**8.80**		8.80	mm	Bobbin width
82	MARGIN	**0.00**		0.00	mm	Safety margin width (Half the primary to secondary creepage distance)
83						
84	**Winding Parameters**					
85	NP			58		Primary winding number of turns
86	NB			8		Bias winding number of turns
87	NS	**14**		14		Secondary winding number of turns
88	BPEAK		Warning	1.1301	T	The transformer's peak flux density should be less than 3800 Gauss. Some core materials may saturate above this limit.
89	BMAX		Warning	0.6174	T	The transformer's operating flux density should be less than 3800 Gauss. Some core materials may saturate above this limit.
90	BAC			0.2615	T	Transformer core AC flux density (0.5 x Peak-Peak)
91	ALG			274.3	nH/turns^2	Gapped core effective inductance (Typical)
92	LG		Info	0.04	mm	Ensure that 0.1mm <= LG <= 1mm for optimal performance and manufacturability
93						
94						
95	**Output Stage**					
96	**Output 1**					
97	VOUT1			24.00		Output voltage
98	IOUT1			0.67		Output current
99	POUT1			16.00		Output power
100	IRMS_SEC1			1.065		Secondary winding RMS current
101	IRIPPLE_COUT1			0.831		Output capacitor ripple current
102	NS1			14		Secondary winding number of turns
103	VDSOFF_DIODE1			114.1		Output rectifier off-time voltage stress (not incl. the parasitic ring)
104	PN_DIODE1			SR515		Suggested output rectifier schottky diode
105	VRRM_DIODE1			150		Output rectifier rated reverse repetitive voltage
106	VF_DIODE1			1.05		Output rectifier rated on-time voltage drop
107	IF_DIODE1			5.0		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			16		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						