

1	ACDC_TOPSwitchGX_032514; Rev.2.17; Copyright Power Integrations 2014	INPUT	INFO	OUTPUT	UNIT	TOP_GX_FX_032514: TOPSwitch-GX/FX Continuous/Discontinuous Flyback Transformer Design Spreadsheet
2	ENTER APPLICATION VARIABLES					Customer
3	VACMIN	85			Volts	Minimum AC Input Voltage
4	VACMAX	265			Volts	Maximum AC Input Voltage
5	fL	50			Hertz	AC Mains Frequency
6	VO	12.00			Volts	Output Voltage (main)
7	PO	20.00			Watts	Output Power
8	n	0.73				Efficiency Estimate
9	Z	0.50				Loss Allocation Factor
10	VB	15			Volts	Bias Voltage
11	tC	3.00			mSeconds	Bridge Rectifier Conduction Time Estimate
12	CIN	68.00			uFarads	Input Filter Capacitor
13						
14	ENTER TOPSWITCH-GX VARIABLES					
15	TOP-GX	TOP244			Universal	115 Doubled/230V
16	Chosen Device		TOP244	Power Out	60W	65W
17	KI	1.00				External Ilimit reduction factor (KI=1.0 for default ILIMIT, KI <1.0 for lower ILIMIT)
18	ILIMITMIN			1.256	Amps	Use 1% resistor in setting external ILIMIT
19	ILIMITMAX			1.445	Amps	Use 1% resistor in setting external ILIMIT
20	Frequency (F)=132kHz, (H)=66kHz	F				Full (F) frequency option - 132kHz
21	fS			132000	Hertz	TOPSwitch-GX Switching Frequency: Choose between 132 kHz and 66 kHz
22	fSmin			124000	Hertz	TOPSwitch-GX Minimum Switching Frequency
23	fSmax			140000	Hertz	TOPSwitch-GX Maximum Switching Frequency
24	VOR	97.60			Volts	Reflected Output Voltage
25	VDS	10.00			Volts	TOPSwitch on-state Drain to Source Voltage
26	VD	0.50			Volts	Output Winding Diode Forward Voltage Drop
27	VDB	0.70			Volts	Bias Winding Diode Forward Voltage Drop
28	KP	0.60				Ripple to Peak Current Ratio (0.4 < KRP < 1.0 : 1.0 < KDP<6.0)
29						
30	ENTER TRANSFORMER CORE/CONSTRUCTION VARIABLES					
31	Core Type	EF25				
32	Core		EF25		P/N:	PC40EF25-Z
33	Bobbin		EF25_BOB BIN		P/N:	*
34	AE			0.5180	cm^2	Core Effective Cross Sectional Area
35	LE			5.7800	cm	Core Effective Path Length
36	AL			2000.0	nH/T^2	Ungapped Core Effective Inductance
37	BW			15.6	mm	Bobbin Physical Winding Width
38	M	0.00			mm	Safety Margin Width (Half the Primary to Secondary Creepage Distance)

39	L	2.00				Number of Primary Layers
40	NS	9				Number of Secondary Turns
41						
42	DC INPUT VOLTAGE PARAMETERS					
43	VMIN			94	Volts	Minimum DC Input Voltage
44	VMAX			375	Volts	Maximum DC Input Voltage
45						
46	CURRENT WAVEFORM SHAPE PARAMETERS					
47	DMAX			0.54		Maximum Duty Cycle
48	I AVG			0.29	Amps	Average Primary Current
49	IP			0.78	Amps	Peak Primary Current
50	IR			0.47	Amps	Primary Ripple Current
51	IRMS			0.41	Amps	Primary RMS Current
52						
53	TRANSFORMER PRIMARY DESIGN PARAMETERS					
54	LP_MIN			757	uHenries	Primary Inductance
55	NP			70		Primary Winding Number of Turns
56	NB			11		Bias Winding Number of Turns
57	ALG			153	nH/T^2	Gapped Core Effective Inductance
58	BM			1612	Gauss	Maximum Flux Density at PO, VMIN (BM<3000)
59	BP			3004	Gauss	Peak Flux Density (BP<4200)
60	BAC			484	Gauss	AC Flux Density for Core Loss Curves (0.5 X Peak to Peak)
61	ur			1776		Relative Permeability of Ungapped Core
62	LG			0.39	mm	Gap Length (Lg > 0.1 mm)
63	BWE			31.2	mm	Effective Bobbin Width
64	OD			0.44	mm	Maximum Primary Wire Diameter including insulation
65	INS			0.06	mm	Estimated Total Insulation Thickness (= 2 * film thickness)
66	DIA			0.38	mm	Bare conductor diameter
67	AWG			27	AWG	Primary Wire Gauge (Rounded to next smaller standard AWG value)
68	CM			203	Cmils	Bare conductor effective area in circular mils
69	CMA			496	Cmils/Amp	Primary Winding Current Capacity (200 < CMA < 500)
70						
71	TRANSFORMER SECONDARY DESIGN PARAMETERS (SINGLE OUTPUT EQUIVALENT)					
72	Lumped parameters					
73	ISP			6.05	Amps	Peak Secondary Current
74	ISRMS			2.97	Amps	Secondary RMS Current
75	IO			1.67	Amps	Power Supply Output Current
76	IRIPPLE			2.46	Amps	Output Capacitor RMS Ripple Current
77						
78	CMS			593	Cmils	Secondary Bare Conductor minimum circular mils

79	AWGS			22	AWG	Secondary Wire Gauge (Rounded up to next larger standard AWG value)
80	DIAS			0.65	mm	Secondary Minimum Bare Conductor Diameter
81	ODS			1.73	mm	Secondary Maximum Outside Diameter for Triple Insulated Wire
82	INSS			0.54	mm	Maximum Secondary Insulation Wall Thickness
83						
84	VOLTAGE STRESS PARAMETERS					
85	VDRAIN			600	Volts	Maximum Drain Voltage Estimate (Includes Effect of Leakage Inductance)
86	PIVS			60	Volts	Output Rectifier Maximum Peak Inverse Voltage
87	PIVB			75	Volts	Bias Rectifier Maximum Peak Inverse Voltage
88						
89						
90						
91						
92						
93	TRANSFORMER SECONDARY DESIGN PARAMETERS (MULTIPLE OUTPUTS)					
94	1st output					
95	VO1			12.00	Volts	Output Voltage
96	IO1			1.67	Amps	Output DC Current
97	PO1			20	Watts	Output Power
98	VD1			0.50	Volts	Output Diode Forward Voltage Drop
99	NS1			9.00		Output Winding Number of Turns
100	ISRMS1			2.967	Amps	Output Winding RMS Current
101	IRIPPLE1			2.46	Amps	Output Capacitor RMS Ripple Current
102	PIVS1			60	Volts	Output Rectifier Maximum Peak Inverse Voltage
103						
104	CMS1			593	Cmils	Output Winding Bare Conductor minimum circular mils
105	AWGS1			22	AWG	Wire Gauge (Rounded up to next larger standard AWG value)
106	DIAS1			0.65	mm	Minimum Bare Conductor Diameter
107	ODS1			1.73	mm	Maximum Outside Diameter for Triple Insulated Wire
108						
109	2nd output					
110	VO2				Volts	Output Voltage
111	IO2				Amps	Output DC Current
112	PO2			0	Watts	Output Power
113	VD2			0.70	Volts	Output Diode Forward Voltage Drop
114	NS2			0.50		Output Winding Number of Turns
115	ISRMS2			0	Amps	Output Winding RMS Current
116	IRIPPLE2			0.00	Amps	Output Capacitor RMS Ripple Current
117	PIVS2			3	Volts	Output Rectifier Maximum Peak Inverse Voltage
118						
119	CMS2			0	Cmils	Output Winding Bare Conductor minimum circular mils

120	AWGS2			N/A	AWG	Wire Gauge (Rounded up to next larger standard AWG value)
121	DIAS2			N/A	mm	Minimum Bare Conductor Diameter
122	ODS2			N/A	mm	Maximum Outside Diameter for Triple Insulated Wire
123						
124	3rd output					
125	VO3				Volts	Output Voltage
126	IO3				Amps	Output DC Current
127	PO3			0	Watts	Output Power
128	VD3			0.70	Volts	Output Diode Forward Voltage Drop
129	NS3			0.50		Output Winding Number of Turns
130	ISRMS3			0	Amps	Output Winding RMS Current
131	IRIPPLE3			0.00	Amps	Output Capacitor RMS Ripple Current
132	PIVS3			3	Volts	Output Rectifier Maximum Peak Inverse Voltage
133						
134	CMS3			0	Cmils	Output Winding Bare Conductor minimum circular mils
135	AWGS3			N/A	AWG	Wire Gauge (Rounded up to next larger standard AWG value)
136	DIAS3			N/A	mm	Minimum Bare Conductor Diameter
137	ODS3			N/A	mm	Maximum Outside Diameter for Triple Insulated Wire
138						
139	Total power			20	Watts	Total Power for Multi-output section
140						
141	Negative Output	N/A		N/A		If negative output exists enter Output number; eg: If VO2 is negative output, enter 2