

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
ENTER APPLICATION VARIABLES					Customer
VACMIN	150			Volts	Minimum AC Input Voltage
VACMAX	265			Volts	Maximum AC Input Voltage
fL	50			Hertz	AC Mains Frequency
VO	12.00			Volts	Output Voltage (main)
PO	120.00			Watts	Output Power
n	0.73				Efficiency Estimate
Z	0.50				Loss Allocation Factor
VB	12			Volts	Bias Voltage
tC	3.00			mSeconds	Bridge Rectifier Conduction Time Estimate
CIN	94.00			uFarads	Input Filter Capacitor
ENTER TOPSWITCH-GX VARIABLES					
TOP-GX	TOP250			Universal	115 Doubled/230V
Chosen Device		TOP250	Power Out	210W	290W
KI	1.00				External Ilimit reduction factor (KI=1.0 for default ILIMIT, KI <1.0 for lower ILIMIT)
ILIMITMIN			5.859	Amps	Use 1% resistor in setting external ILIMIT
ILIMITMAX			6.741	Amps	Use 1% resistor in setting external ILIMIT
Frequency (F)=132kHz, (H)=66kHz	F				Full (F) frequency option - 132kHz
fS			132000	Hertz	TOPSwitch-GX Switching Frequency: Choose between 132 kHz and 66 kHz
fSmin			124000	Hertz	TOPSwitch-GX Minimum Switching Frequency
fSmax			140000	Hertz	TOPSwitch-GX Maximum Switching Frequency
VOR	120.00			Volts	Reflected Output Voltage
VDS	10.00			Volts	TOPSwitch on-state Drain to Source Voltage
VD	0.50			Volts	Output Winding Diode Forward Voltage Drop
VDB	0.70			Volts	Bias Winding Diode Forward Voltage Drop
KP	0.64				Ripple to Peak Current Ratio (0.4 < KRP < 1.0 : 1.0 < KDP < 6.0)
ENTER TRANSFORMER CORE/CONSTRUCTION VARIABLES					
Core Type	ETD34				
Core		ETD34		P/N:	PC40ETD34-Z
Bobbin		ETD34_B OBBIN		P/N:	*
AE			0.9710	cm^2	Core Effective Cross Sectional Area
LE			7.8600	cm	Core Effective Path Length
AL			2780.0	nH/T^2	Ungapped Core Effective Inductance
BW			20.9	mm	Bobbin Physical Winding Width
M	0.00			mm	Safety Margin Width (Half the Primary to Secondary Creepage Distance)
L	2.00				Number of Primary Layers
NS	4				Number of Secondary Turns
DC INPUT VOLTAGE PARAMETERS					
VMIN			143	Volts	Minimum DC Input Voltage

VMAX			375	Volts	Maximum DC Input Voltage
<b>CURRENT WAVEFORM SHAPE PARAMETERS</b>					
DMAX			0.47		Maximum Duty Cycle
I AVG			1.15	Amps	Average Primary Current
IP			3.56	Amps	Peak Primary Current
IR			2.28	Amps	Primary Ripple Current
IRMS			1.73	Amps	Primary RMS Current
<b>TRANSFORMER PRIMARY DESIGN PARAMETERS</b>					
LP_MIN			208	$\mu$ Henries	Primary Inductance
NP			38		Primary Winding Number of Turns
NB			4		Bias Winding Number of Turns
ALG			141	nH/T <sup>2</sup>	Gapped Core Effective Inductance
BM			1984	Gauss	Maximum Flux Density at PO, VMIN (BM<3000)
BP			3755	Gauss	Peak Flux Density (BP<4200)
BAC			635	Gauss	AC Flux Density for Core Loss Curves (0.5 X Peak to Peak)
ur			1791		Relative Permeability of Ungapped Core
LG			0.82	mm	Gap Length (Lg > 0.1 mm)
BWE			41.8	mm	Effective Bobbin Width
OD			1.09	mm	Maximum Primary Wire Diameter including insulation
INS			0.09	mm	Estimated Total Insulation Thickness (= 2 * film thickness)
DIA			1.00	mm	Bare conductor diameter
AWG			19	AWG	Primary Wire Gauge (Rounded to next smaller standard AWG value)
CM			1290	Cmils	Bare conductor effective area in circular mils
CMA		Warning	747	Cmils/Amp	!!! DECREASE CMA (200 < CMA < 500) Decrease L(primary layers),increase NS,smaller Core
<b>TRANSFORMER SECONDARY DESIGN PARAMETERS (SINGLE OUTPUT EQUIVALENT)</b>					
<i>Lumped parameters</i>					
ISP			34.19	Amps	Peak Secondary Current
ISRMS			17.48	Amps	Secondary RMS Current
IO			10.00	Amps	Power Supply Output Current
IRIPPLE			14.33	Amps	Output Capacitor RMS Ripple Current
CMS			3495	Cmils	Secondary Bare Conductor minimum circular mils
AWGS			14	AWG	Secondary Wire Gauge (Rounded up to next larger standard AWG value)
DIAS			1.63	mm	Secondary Minimum Bare Conductor Diameter
ODS			5.23	mm	Secondary Maximum Outside Diameter for Triple Insulated Wire
INSS			1.80	mm	Maximum Secondary Insulation Wall Thickness
<b>VOLTAGE STRESS PARAMETERS</b>					
VDRAIN			647	Volts	Maximum Drain Voltage Estimate (Includes Effect of Leakage Inductance)
PIVS			51	Volts	Output Rectifier Maximum Peak Inverse Voltage

PIVB		52	Volts	Bias Rectifier Maximum Peak Inverse Voltage
<b>TRANSFORMER SECONDARY DESIGN PARAMETERS (MULTIPLE OUTPUTS)</b>				
<i>1st output</i>				
VO1		12.00	Volts	Output Voltage
IO1		10.00	Amps	Output DC Current
PO1		120	Watts	Output Power
VD1		0.50	Volts	Output Diode Forward Voltage Drop
NS1		4.00		Output Winding Number of Turns
ISRMS1		17.476	Amps	Output Winding RMS Current
IRIPPLE1		14.33	Amps	Output Capacitor RMS Ripple Current
PIVS1		51	Volts	Output Rectifier Maximum Peak Inverse Voltage
CMS1		3495	Cmils	Output Winding Bare Conductor minimum circular mils
AWGS1		14	AWG	Wire Gauge (Rounded up to next larger standard AWG value)
DIAS1		1.63	mm	Minimum Bare Conductor Diameter
ODS1		5.23	mm	Maximum Outside Diameter for Triple Insulated Wire
<i>2nd output</i>				
VO2			Volts	Output Voltage
IO2			Amps	Output DC Current
PO2		0	Watts	Output Power
VD2		0.70	Volts	Output Diode Forward Voltage Drop
NS2		0.22		Output Winding Number of Turns
ISRMS2		0	Amps	Output Winding RMS Current
IRIPPLE2		0.00	Amps	Output Capacitor RMS Ripple Current
PIVS2		2	Volts	Output Rectifier Maximum Peak Inverse Voltage
CMS2		0	Cmils	Output Winding Bare Conductor minimum circular mils
AWGS2		N/A	AWG	Wire Gauge (Rounded up to next larger standard AWG value)
DIAS2		N/A	mm	Minimum Bare Conductor Diameter
ODS2		N/A	mm	Maximum Outside Diameter for Triple Insulated Wire
<i>3rd output</i>				
VO3			Volts	Output Voltage
IO3			Amps	Output DC Current
PO3		0	Watts	Output Power
VD3		0.70	Volts	Output Diode Forward Voltage Drop
NS3		0.22		Output Winding Number of Turns
ISRMS3		0	Amps	Output Winding RMS Current
IRIPPLE3		0.00	Amps	Output Capacitor RMS Ripple Current
PIVS3		2	Volts	Output Rectifier Maximum Peak Inverse Voltage
CMS3		0	Cmils	Output Winding Bare Conductor minimum circular mils
AWGS3		N/A	AWG	Wire Gauge (Rounded up to next larger standard AWG value)

<i>DIAS3</i>			<i>N/A</i>	<i>mm</i>	<i>Minimum Bare Conductor Diameter</i>
<i>ODS3</i>			<i>N/A</i>	<i>mm</i>	<i>Maximum Outside Diameter for Triple Insulated Wire</i>
<i>Total power</i>			<i>120</i>	<i>Watts</i>	<i>Total Power for Multi-output section</i>
<i>Negative Output</i>	<i>N/A</i>		<i>N/A</i>		<i>If negative output exists enter Output number; eg: If VO2 is negative output, enter 2</i>