ACDC_SC1957C_Flyback_082119; Rev.0.1; Copyright Power Integrations 2019	INPUT	INFO	OUTPUT	UNITS	SC1957C Flyback Design Spreadsheet
APPLICATION VARIABLES					Design Title
VAC_MIN	180		180	V	Minimum AC line voltage
VAC_MAX			265	V	Maximum AC input voltage
VAC_RANGE			HIGH LINE		AC line voltage range
FLINE			60	Hz	AC line voltage frequency
CAP_INPUT	120.0		120.0	uF	Input capacitance
SET-POINT 1					
VOUT1	12.00		12.00	V	Output voltage 1, should be the highest output voltage required
IOUT1	9.400		9.400	A	Output current 1
POUT1			112.80	W	Output power 1
EFFICIENCY1	0.90		0.90		`
Z_FACTOR1	0.50		0.50		Z-factor for output 1
SET-POINT 2					
VOUT2			0.00	V	Output voltage 2
IOUT2			0.000	A	Output current 2
POUT2			0.00	W	Output power 2
EFFICIENCY2	0.89		0.89		Converter efficiency for output 2
Z_FACTOR2	0.50		0.50		Z-factor for output 2
SET-POINT 3					
VOUT3			0.00	V	Output voltage 3
IOUT3	3.000		3.000	A	Output current 3
POUT3			0.00	W	Output power 3
EFFICIENCY3	0.89		0.89		Converter efficiency for output 3
Z_FACTOR3	0.50		0.50		Z-factor for output 3
SET-POINT 4					
VOUT4			0.00	V	Output voltage 4
IOUT4	3.000		3.000	A	Output current 4
POUT4			0.00	W	Output power 4
EFFICIENCY4	0.88		0.88		Converter efficiency for output 4
Z_FACTOR4	0.50		0.50		Z-factor for output 4
SET-POINT 5					
VOUT5			0.00	V	Output voltage 5
IOUT5			0.000	A	Output current 5
POUT5			0.00	W	Output power 5
EFFICIENCY5			0.00		Converter efficiency for output 5
Z_FACTOR5			0.00		Z-factor for output 5
SET-POINT 6					
VOUT6			0.00	V	Output voltage 6
IOUT6			0.000	A	Output current 6
POUT6			0.00	W	Output power 6
EFFICIENCY6			0.00		Converter efficiency for output 6

Z_FACTOR6			0.00		Z-factor for output 6
SET-POINT 7					
VOUT7			0.00	V	Output voltage 7
IOUT7			0.000	A	Output current 7
POUT7			0.00	W	Output power 7
EFFICIENCY7			0.00		Converter efficiency for output 7
Z_FACTOR7			0.00		Z-factor for output 7
SET-POINT 8					
VOUT8			0.00	V	Output voltage 8
IOUT8			0.000	A	Output current 8
POUT8			0.00	W	Output power 8
EFFICIENCY8			0.00		Converter efficiency for output 8
Z_FACTOR8			0.00		Z-factor for output 8
SET-POINT 9					
VOUT9			0.00	V	Output voltage 9
IOUT9			0.000	A	Output current 9
POUT9			0.00	W	Output power 9
EFFICIENCY9			0.00		Converter efficiency for output 9
Z_FACTOR9			0.00		Z-factor for output 9
PERCENT_CDC			0%		Percentage (of output voltage) cable drop compensation desired at full load
CDC_SCALING_SETPOINT			1		Select the set-point number for the voltage used for cable drop compensation (typically the 5V output)
PRIMARY CONTROLLER SELECTION					
ENCLOSURE	ADAPTER		ADAPTER		Power supply enclosure
ILIMIT_MODE	STANDARD		STANDARD		Device current limit mode
VDRAIN_BREAKDOWN			750	V	Device breakdown voltage
DEVICE_GENERIC	SC1957-H005		SC1957-H005		Device selection
DEVICE_CODE			SC1957C-H005		Device code
PDEVICE_MAX			130	W	Device maximum power capability
RDSON_25DEG			0.39	Ω	Primary switch on-time resistance at 25°C
RDSON_100DEG			0.54	Ω	Primary switch on-time resistance at 100°C
ILIMIT_MIN			3.534	A	Primary switch minimum current limit
ILIMIT_TYP			3.800	A	Primary switch typical current limit
ILIMIT_MAX			4.066	A	Primary switch maximum current limit
VDRAIN_ON_SWITCH			0.29	V	Primary switch on-time voltage drop
VDRAIN_OFF_SWITCH			563.31	V	Peak drain voltage on the primary switch during turn-off
WORST CASE ELECTRICAL PARAMETERS					

FSWITCHING_MAX	85000		85000	Hz	Maximum switching frequency at full load and the valley of the minimum input AC voltage
VOR	120.0		120.0	V	Voltage reflected to the primary winding (corresponding to set-point 1) when the primary switch turns off
VMIN			225.23	V	Valley of the rectified minimum input AC voltage at full load
KP			1.201		Measure of continuous/discontinuous mode of operation
MODE_OPERATION			DCM		Mode of operation
DUTYCYCLE			0.308		Primary switch duty cycle
TIME_ON			4.38	us	Primary switch on-time
TIME_OFF			8.18	us	Primary switch off-time
LPRIMARY_MIN			231.9	uH	Minimum primary magnetizing inductance
LPRIMARY_TYP			244.1	uH	Typical primary magnetizing inductance
LPRIMARY_TOL			5.0	%	Primary magnetizing inductance tolerance
LPRIMARY_MAX			256.3	uH	Maximum primary magnetizing inductance
PRIMARY CURRENT					
IAVG_PRIMARY			0.529	A	Primary switch average current
IPEAK_PRIMARY			3.885	A	Primary switch peak current
IPEDESTAL_PRIMARY			0.000	A	Primary switch current pedestal
IRIPPLE_PRIMARY			3.885	A	Primary switch ripple current
IRMS_PRIMARY			1.171	A	Primary switch RMS current
SECONDARY CURRENT					
IPEAK_SECONDARY			38.846	A	Secondary switch peak current
IPEDESTAL_SECONDARY			0.000	A	Secondary switch pedestal current
IRMS_SECONDARY			16.030	A	Secondary switch RMS current
IRIPPLE_CAP_OUT			12.985	A	Output capacitor ripple current
TRANSFORMER CONSTRUCTION PARAMETERS					
CORE SELECTION					
CORE	POT33/19	Info	POT33/19		The transformer windings may not fit: pick a bigger core or bobbin and refer to the Transformer Parameters tab for fit calculations
CORE NAME			POT33/19-JP95		Core code
AE			147.4	mm^2	Core cross sectional area
LE			51.0	mm	Core magnetic path length
AL			5500	nH	Ungapped core effective inductance per turns squared
VE			7517	mm^3	Core volume
BOBBIN NAME			POT33/19		Bobbin name
AW			49.4	mm^2	Bobbin window area
BW			10.50	mm	Bobbin width
MARGIN			0.0	mm	Bobbin safety margin
PRIMARY WINDING					
NPRIMARY			20		Primary winding number of turns
BPEAK			3619	Gauss	Peak flux density

BMAX			3338	Gauss	Maximum flux density
BAC			1669	Gauss	AC flux density (0.5 x Peak to Peak)
ALG			610	nH	Typical gapped core effective inductance per turns squared
LG			0.270	mm	Core gap length
LAYERS_PRIMARY	2		2		Primary winding number of layers
AWG_PRIMARY			19		Primary wire gauge
OD_PRIMARY_INSULATED			0.993	mm	Primary wire insulated outer diameter
OD_PRIMARY_BARE			0.912	mm	Primary wire bare outer diameter
CMA_PRIMARY		Info	1100.2	Cmils/A	The primary winding wire CMA is higher than 500 mil^2/Amperes: Decrease the primary layers or wire thickness
SECONDARY WINDING					
NSECONDARY			2		Secondary winding number of turns
AWG_SECONDARY	16		16		Secondary wire gauge
OD_SECONDARY_INSULATED			1.595	mm	Secondary wire insulated outer diameter
OD_SECONDARY_BARE			1.291	mm	Secondary wire bare outer diameter
CMA_SECONDARY		Warning	161.1	Cmils/A	The secondary winding wire CMA is less than 200 mil^2/Amperes: Increase the wire thickness
BIAS WINDING					
NBIAS			2		Bias winding number of turns
PRIMARY COMPONENTS SELECTION					
LINE UNDERVOLTAGE					
BROWN-IN REQURED			144.00	V	Required line brown-in threshold
RLS			2.54	MΩ	Connect two 1.27 MOhm resistors to the V-pin for the required UV/OV threshold
BROWN-IN ACTUAL			144.14	V	Actual brown-in threshold using standard resistors
BROWN-OUT ACTUAL			126.18	V	Actual brown-out threshold using standard resistors
LINE OVERVOLTAGE					
OVERVOLTAGE_LINE		Info	212.39	V	The line over-voltage threshold is lower than the maximum input AC RMS voltage
BIAS WINDING					
VBIAS			9.00	V	Rectified bias voltage at the lowest output set-point
VF_BIAS			0.70	V	Bias winding diode forward drop
VREVERSE_BIASDIODE			46.33	V	Bias diode reverse voltage (not accounting parasitic voltage ring)
CBIAS			22	uF	Bias winding rectification capacitor
CBPP			0.47	uF	BPP pin capacitor
SECONDARY COMPONENTS SELECTION					
RECTIFIER					
VDRAIN_OFF_SRFET			49.33	V	Secondary rectifier reverse voltage (not accounting parasitic voltage ring)

SRFET	AUTO		SiR826DP		Secondary rectifier (Logic MOSFET)
VBREAKDOWN_SRFET			80	V	Secondary rectifier breakdown voltage
RDSON_SRFET			6.5	mΩ	SRFET on time drain resistance at 25degC for VGS=4.4V
FEEDBACK COMPONENTS					
RFB_UPPER			100.00	kΩ	Upper feedback resistor (connected to the output terminal)
RFB_LOWER			11.80	kΩ	Lower feedback resistor required to obtain the output for cable drop compensation
CFB_LOWER			330	pF	Lower feedback resistor decoupling capacitor
SET-POINTS ANALYSIS					
TOLERANCE CORNER					
USER_VAC	170		170	V	Input AC RMS voltage corner to be evaluated
USER_ILIMIT	TYP		3.800	A	Current limit corner to be evaluated
USER_LPRIMARY	TYP		244.1	uH	Primary inductance corner to be evaluated
SET-POINT SELECTION					
SET-POINT	1		1		Select the set-point which needs to be evaluated
FSWITCHING			72641.9	Hz	Maximum switching frequency at full load and the valley of the minimum input AC voltage
VOR			120.0	V	Voltage reflected to the primary winding when the primary switch turns off
VMIN			209.39	V	Valley of the minimum input AC voltage
KP			1.273		Measure of continuous/discontinuous mode of operation
MODE_OPERATION			DCM		Mode of operation
DUTYCYCLE			0.311		Primary switch duty cycle
TIME_ON			4.28	us	Primary switch on-time
TIME_OFF			9.49	us	Primary switch off-time
PRIMARY CURRENT					
IAVG_PRIMARY			0.569	A	Primary switch average current
IPEAK_PRIMARY			3.664	A	Primary switch peak current
IPEDESTAL_PRIMARY			0.000	A	Primary switch current pedestal
IRIPPLE_PRIMARY			3.664	A	Primary switch ripple current
IRMS_PRIMARY			1.179	A	Primary switch RMS current
SECONDARY CURRENT					
IPEAK_SECONDARY			36.643	A	Secondary switch peak current
IPEDESTAL_SECONDARY			0.000	A	Secondary switch pedestal current
IRMS_SECONDARY			15.569	A	Secondary switch RMS current
IRIPPLE_CAP_OUT			12.411	A	Output capacitor ripple current
MAGNETIC FLUX DENSITY					
BPEAK			3221	Gauss	Peak flux density
BMAX			3035	Gauss	Maximum flux density
BAC			1517	Gauss	AC flux density (0.5 x Peak to Peak)