1	ACDC_LYTSwitch5_IsolatedFlyback_080516; Rev.1.0; Copyright Power Integrations 2016	INPUT	INFO	OUTPUT	UNITS	LYTSwitch-5 Isolated Flyback Design Spreadsheet
2	ENTER APPLICATION VARIABLES					Design Title
3	VACMIN			95.0	Volts RMS	Minimum AC line voltage.
4	VACNOM	230.0		230.0	Volts RMS	Nominal AC line voltage.
5	VACMAX			265.0	Volts RMS	Maximum AC line voltage.
6	FL			50	Hertz	AC line frequency.
7	VO_MIN			28.8	Volts DC	Guaranteed minimum VO that maintains output regulation.
8	VO	32.0		32.0	Volts DC	Worst case normal operating output voltage.
9	VO_OVP_MIN			37.6	Volts DC	Minimum Voltage at which output voltage protection may be activated.
10	IO	280.0		280.0	m-Amperes	Average output current specification.
11	EFFICIENCY			0.85	Dimensionless	Total power supply efficiency.
12	Z			0.50	Dimensionless	Loss allocation factor.
13	PO			8.96	Watts	Output power.
14						
15						
16						
17	LYTSwitch-5 DESIGN VARIABLES					
18	BREAKDOWN VOLTAGE	725		725	Volts DC	Choose between 650V and 725V.
19	GENERIC DEVICE	LYT52X6D		LYT52X6D		Chosen LYTSwitch-5 generic device.
20	ACTUAL DEVICE			LYT5226D		Chosen LYTSwitch-5 device code.
21	ILIMITMIN			1.767	Amperes	Minimum device current limit.
22	ILIMITTYP			1.900	Amperes	Typical Current Limit.
23	ILIMITMAX			2.033	Amperes	Maximum Current Limit.
24	IP_MOSFET			1.147	Amperes	Worst case peak drain current of the MOSFET.
25	TON_MIN			1.197	u-seconds	Worst case minimum on-time of the MOSFET.
26	TON_MAX			3.154	u-seconds	Worst case maximum on-time of the MOSFET.
27	IAVG_MOSFET			0.102	Amperes	Worst case average drain current of the MOSFET.
28	IRMS_MOSFET			0.223	Amperes	Worst case maximum RMS current of the MOSFET.
29	KDP			1.100	Dimensionless	Ratio between off-time of the MOSFET and on-time of the secondary diode.
30	VDRAIN			494.8	Volts DC	Estimated worst case drain voltage of the MOSFET.

31						
32						
33						
34	DEVICE PROGRAMMING PARAMETERS					
35	RDO			6	k-ohms	DO pin resistor.
36	RDS			6	k-ohms	Current sense programming resistor connected to the DS pin for the isolated flyback converter.
37						
38						
39						
40	ENTER TRANSFORMER CONSTRUCTION VARIABLES					
41	CORE TYPE	EE16		EE16		Core type.
42	AE			19.20	mm^2	Core effective cross sectional area.
43	LE			35.00	mm	Core effective path length.
44	AL			1140	nH/T^2	Ungapped core effective inductance.
45	VE			795	mm^3	Core volume.
46	AW			14.76	mm^2	Window area of the bobbin.
47	BW			8.50	mm	Bobbin physical winding width.
48	MARGIN			0.00	mm	Safety Margin Width (Half the Primary to Secondary Creepage Distance)
49						
50						
51						
52	TRANSFORMER DESIGN PARAMETERS					
53	Primary winding parameters					
54	LP			457	u-Henrys	Typical value of the primary inductance.
55	LP_TOL			10	%	Tolerance of the primary inductance.
56	LP_MIN			411	u-Henrys	Minimum value of the primary inductance.
57	LP_MAX			502	u-Henrys	Maximum value of the primary inductance.
58	NP			130	Turns	Number of primary turns.
59	ALG			27.01	nH/T^2	Gapped core effective inductance.
60	BM			2307	Gauss	Maximum flux density.
61	BP			4090	Gauss	Peak flux density.

62	BAC			1153	Gauss	Worst case AC Flux Density for Core Loss Curves (0.5 X Peak to Peak).
63	LG			0.9	mm	Core gap length.
64	LAYERS_PRIMARY_DESIRED			4	Dimensionless	Desired number of primary layers.
65	AWG_PRIMARY			32	AWG	Primary wire gauge.
66	OD_PRIMARY_INSULATED			0.244	mm	Outer diameter of the primary winding wire with insulation.
67	OD_PRIMARY_BARE			0.202	mm	Outer diameter of the primary winding wire without insulation.
68	IRMS_PRIMARY			0.223	Amperes	Maximum RMS current flowing through the primary winding.
69	CMA_PRIMARY			283	mils^2/Amperes	Primary winding CMA.
70	J_PRIMARY			6.97	Amperes/mm^2	Primary winding current density.
71						
72						
73	Secondary winding parameters					
74	VOR			90	Volts DC	Output voltage reflected to the primary winding when the MOSFET is off.
75	NS			47	Dimensionless	Number of secondary turns.
76	AWG_SECONDARY			28	Dimensionless	Secondary wire gauge.
77	OD_SECONDARY_INSULATED			0.375	mm	Outer diameter of the secondary winding wire with insulation.
78	OD_SECONDARY_BARE			0.321	mm	Outer diameter of the secondary winding wire without insulation.
79	IRMS_SECONDARY			0.770	Amperes	Maximum RMS current flowing through the secondary winding.
80	CMA_SECONDARY			208	mils^2/Amperes	Secondary winding CMA.
81	J_SECONDARY			9.50	Amperes/mm^2	Secondary winding current density.
82						
83	Bias winding parameters					
84	VD_BIAS			0.70	Volts DC	Bias winding diode forward drop voltage.
85	BIAS TURNS			19	Turns	Number of bias winding turns.

86	VBIAS			12.0	Volts DC	Bias Voltage. Check performance at minimum VO and VACMAX.
87	PIVBS			77.7	Volts DC	Output Rectifier Maximum Peak Inverse Voltage (calculated at VACMAX)
88	CBIAS			22.0	u-Farads	Bias winding rectification capacitor.
89	RBP			7.00	k-Ohms	Bias supply resistor assuming 1mA current necessary to supply the BP pin.
90	CBP			2.2	u-Farads	Minimum BP pin capacitance.
91						
92						
93						
94	SECONDARY DIODE PARAMETERS					
95	VF_DIODE			0.7	Volts DC	Output diode forward voltage drop.
96	IRMS_DIODE			0.770	Amperes	Diode RMS current at LP_MIN, VACMIN and PO_MAX.
97	IP_DIODE			3.171	Amperes	Diode peak current at LP_MIN ,VACMAX and PO_MAX.
98	PIV_DIODE			190.4	Volts DC	Peak Inverse Voltage at VO_MAX on output diode.
99						
100						
101						
102	FEEDBACK AND PROTECTION PARAMETERS WITH FINE TUNING					
103	RL			3.74	M-Ohms	Standard (E96 / 1%) L pin resistor.
104	OVP_LINE			317.3	Volts RMS	Line overvoltage based on the actual L pin resistor used.
105	RDC_THEORETICAL			3.93	Ohms	Theoretical DS pin sense resistor.
106	RDC			3.92	Ohms	Standard (E96 / 1%) DS pin sense resistor.
107	CDC			10.0	u-Farads	Standard capacitor connected in parallel with the DS pin sense resistor.
108	VBIAS_MEASURED			12.0	Volts DC	Actual bias voltage (across the bias capacitor) measured on the bench.
109	VO_MEASURED			32.0	Volts DC	Actual load voltage measured on the bench.
110	ROC			100.0	k-Ohms	Standard (E96 / 1%) OC pin resistor.
111	IO_ACTUAL			280.0	m-Amperes	Actual output current seen on the bench.
112	RFB_THEORETICAL			39.1	k-Ohms	Calculated value of RFB, using standard values for RDS, ROVP, and RL
113	RFB			39.2	k-Ohms	Standard (E96 / 1%) F pin resistor.

114	CFB			150.0	n-Farads	Standard capacitor connected to the F pin.
115						
116						