

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	90.0		90.0	Volts RMS	Minimum AC line voltage.
4	VACNOM	230.0		230.0	Volts RMS	Nominal AC line voltage.
5	VACMAX	305.0		305.0	Volts RMS	Maximum AC line voltage.
6	FL			50	Hertz	AC line frequency.
7	VO_MIN			10.8	Volts DC	Guaranteed minimum VO that maintains output regulation.
8	VO	12.0		12.0	Volts DC	Worst case normal operating output voltage.
9	VO_OVP_MIN			14.8	Volts DC	Minimum Voltage at which output voltage protection may be activated.
10	IO	700.0		700.0	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			8.40	Watts	Output power.
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17	LYTSwitch-5 DESIGN VARIABLES					
18	BREAKDOWN VOLTAGE	725 ▼		725	Volts DC	Choose between 650V and 725V.
19	GENERIC DEVICE	Auto ▼		LYT52X5D		Chosen LYTSwitch-5 generic device.
20	ACTUAL DEVICE			LYT5225D		Chosen LYTSwitch-5 device code.
21	ILIMITMIN			1.232	Amperes	Minimum device current limit.
22	ILIMITTYP			1.325	Amperes	Typical Current Limit.
23	ILIMITMAX			1.418	Amperes	Maximum Current Limit.
24	IP_MOSFET			1.144	Amperes	Worst case peak drain current of the MOSFET.
25	TON_MIN		Warning	1.128	u-seconds	The minimum on-time of the design is less than that recommended for the device.
26	TON_MAX			3.262	u-seconds	Worst case maximum on-time of the MOSFET.
27	IAVG_MOSFET			0.101	Amperes	Worst case average drain current of the MOSFET.
28	IRMS_MOSFET			0.214	Amperes	Worst case maximum RMS current of the MOSFET.
29	KDP			1.099	Dimensionless	Ratio between off-time of the MOSFET and on-time of the secondary diode.
30	VDRAIN			551.3	Volts DC	Estimated worst case drain voltage of the MOSFET.
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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.

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40	ENTER TRANSFORMER CONSTRUCTION VARIABLES					
41	CORE TYPE	EE13 ▼		EE13		Core type.
42	AE			17.10	mm^2	Core effective cross sectional area.
43	LE			30.20	mm	Core effective path length.
44	AL			1130	nH/T^2	Ungapped core effective inductance.
45	VE			517	mm^3	Core volume.
46	AW			18.43	mm^2	Window area of the bobbin.
47	BW			7.60	mm	Bobbin physical winding width.
48	MARGIN			0.00	mm	Safety Margin Width (Half the Primary to Secondary Creepage Distance)
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52	TRANSFORMER DESIGN PARAMETERS					
53	Primary winding parameters					
54	LP			478	u-Henrys	Typical value of the primary inductance.
55	LP_TOL	7		7	%	Tolerance of the primary inductance.
56	LP_MIN			445	u-Henrys	Minimum value of the primary inductance.
57	LP_MAX			512	u-Henrys	Maximum value of the primary inductance.
58	NP			107	Turns	Number of primary turns.
59	ALG			41.76	nH/T^2	Gapped core effective inductance.
60	BM			3198	Gauss	Maximum flux density.
61	BP			3964	Gauss	Peak flux density.
62	BAC			1599	Gauss	Worst case AC Flux Density for Core Loss Curves (0.5 X Peak to Peak).
63	LG			0.5	mm	Core gap length.
64	LAYERS_PRIMARY_DESIRED			4	Dimensionless	Desired number of primary layers.
65	AWG_PRIMARY			31	AWG	Primary wire gauge.
66	OD_PRIMARY_INSULATED			0.272	mm	Outer diameter of the primary winding wire with insulation.
67	OD_PRIMARY_BARE			0.227	mm	Outer diameter of the primary winding wire without insulation.
68	IRMS_PRIMARY			0.214	Amperes	Maximum RMS current flowing through the primary winding.
69	CMA_PRIMARY			372	mils^2/Amperes	Primary winding CMA.
70	J_PRIMARY			5.31	Amperes/mm^2	Primary winding current density.
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73	Secondary winding parameters					
74	VOR			90	Volts DC	Output voltage reflected to the primary winding when the MOSFET is off.
75	NS	15		15	Dimensionless	Number of secondary turns.
76	AWG_SECONDARY			24	Dimensionless	Secondary wire gauge.

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77	OD_SECONDARY_INSULATED			0.577	mm	Outer diameter of the secondary winding wire with insulation.
78	OD_SECONDARY_BARE			0.511	mm	Outer diameter of the secondary winding wire without insulation.
79	IRMS_SECONDARY			1.922	Amperes	Maximum RMS current flowing through the secondary winding.
80	CMA_SECONDARY			210	mils^2/Amperes	Secondary winding CMA.
81	J_SECONDARY			9.39	Amperes/mm^2	Secondary winding current density.
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83	Bias winding parameters					
84	VD_BIAS			0.70	Volts DC	Bias winding diode forward drop voltage.
85	BIAS TURNS			15	Turns	Number of bias winding turns.
86	VBIAS			12.0	Volts DC	Bias Voltage. Check performance at minimum VO and VACMAX.
87	PIVBS			84.6	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.
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94	SECONDARY DIODE PARAMETERS					
95	VF_DIODE			0.7	Volts DC	Output diode forward voltage drop.
96	IRMS_DIODE			1.922	Amperes	Diode RMS current at LP_MIN, VACMIN and PO_MAX.
97	IP_DIODE			8.160	Amperes	Diode peak current at LP_MIN, VACMAX and PO_MAX.
98	PIV_DIODE			82.8	Volts DC	Peak Inverse Voltage at VO_MAX on output diode.
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102	FEEDBACK AND PROTECTION PARAMETERS WITH FINE TUNING					
103	RL			4.32	M-Ohms	Standard (E96 / 1%) L pin resistor.
104	OVP_LINE			366.6	Volts RMS	Line overvoltage based on the actual L pin resistor used.
105	RDC_THEORETICAL			3.97	Ohms	Theoretical DS pin sense resistor.
106	RDC			4.02	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			12.0	Volts DC	Actual load voltage measured on the bench.

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110	ROC			100.0	k-Ohms	Standard (E96 / 1%) OC pin resistor.
111	IO_ACTUAL			700.0	m-Amperes	Actual output current seen on the bench.
112	RFB_THEORETICAL			47.0	k-Ohms	Calculated value of RFB, using standard values for RDS, ROVP, and RL
113	RFB			47.5	k-Ohms	Standard (E96 / 1%) F pin resistor.
114	CFB			120.0	n-Farads	Standard capacitor connected to the F pin.
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