

ACDC_InnoSwitch3-CE_Flyback_03 0223; Rev.2.00; Copyright Power Integrations 2023	INPUT	INFO	OUTPUT	UNITS	InnoSwitch3 CE Flyback Design Spreadsheet
APPLICATION VARIABLES					Design Title
VIN_MIN	141		141	V	Minimum AC input voltage
VIN_MAX	1485	Info	1485	V	Input voltage too high: Decrease the maximum AC input voltage or verify the voltage rating of the input capacitor
VIN_RANGE			UNIVERSAL		Range of AC input voltage
LINEFREQ			60	Hz	AC Input voltage frequency
CAP_INPUT			40.1	uF	Input capacitor
VOUT	12.00		12.00	V	Output voltage at the board
CDC	0		0	mV	Cable drop compensation desired at full load
IOUT	1.670		1.670	A	Output current
POUT			20.04	W	Output power
EFFICIENCY	0.89		0.89		AC-DC efficiency estimate at full load given that the converter is switching at the valley of the rectified minimum input AC voltage
FACTOR_Z	0.50		0.50		Z-factor estimate
ENCLOSURE	OPEN FRAME		OPEN FRAME		Power supply enclosure
PRIMARY CONTROLLER SELECTION					
ILIMIT_MODE	INCREASED		INCREASED		Device current limit mode
DEVICE_GENERIC	INN31X8		INN31X8		Generic device code
DEVICE_CODE			INN3168C		Actual device code
POUT_MAX			55	W	Power capability of the device based on thermal performance
RDSON_100DEG			1.54	Ω	Primary switch on time drain resistance at 100 degC
ILIMIT_MIN			1.683	A	Minimum current limit of the primary switch
ILIMIT_TYP			1.850	A	Typical current limit of the primary switch
ILIMIT_MAX			2.017	A	Maximum current limit of the primary switch
VDRAIN_BREAKDOWN			650	V	Device breakdown voltage
VDRAIN_ON_PRSW			0.02	V	Primary switch on time drain voltage
VDRAIN_OFF_PRSW		Warning	2293.7	V	The peak drain voltage on the switch is higher than 585V: Decrease the device VOR
WORST CASE ELECTRICAL PARAMETERS					
FSWITCHING_MAX	25000	Info	25000	Hz	The minimum operating frequency is lower than 25kHz: may result in audible noise
VOR	125.0		125.0	V	Secondary voltage reflected to the primary when the primary switch turns off
VMIN	2000.00	Info	2000.00	V	A manual overwrite of VMIN voids the value of input capacitor calculated by the tool or manually entered by the user and will be used for all calculations
KP			3.37		Measure of continuous/discontinuous mode of operation
MODE_OPERATION			DCM		Mode of operation
DUTYCYCLE			0.018		Primary switch duty cycle

TIME_ON		0.83	us	Primary switch on-time
TIME_OFF		39.29	us	Primary switch off-time
LPRIMARY_MIN		1181.1	uH	Minimum primary inductance
LPRIMARY_TYP		1243.3	uH	Typical primary inductance
LPRIMARY_TOL		5.0	%	Primary inductance tolerance
LPRIMARY_MAX		1305.4	uH	Maximum primary inductance
<b>PRIMARY CURRENT</b>				
IPEAK_PRIMARY		1.302	A	Primary switch peak current
IPEDESTAL_PRIMARY		0.000	A	Primary switch current pedestal
I AVG_PRIMARY		0.011	A	Primary switch average current
IRIPPLE_PRIMARY		1.302	A	Primary switch ripple current
IRMS_PRIMARY		0.096	A	Primary switch RMS current
<b>SECONDARY CURRENT</b>				
IPEAK_SECONDARY		13.581	A	Secondary winding peak current
IPEDESTAL_SECONDARY		0.000	A	Secondary winding current pedestal
IRMS_SECONDARY		4.009	A	Secondary winding RMS current
<b>TRANSFORMER CONSTRUCTION PARAMETERS</b>				
<b>CORE SELECTION</b>				
CORE	Custom	Custom		Core selection
CORE CODE	EIQ30	EIQ30		Core code
AE	108.00	108.00	mm <sup>2</sup>	Core cross sectional area
LE	43.00	43.00	mm	Core magnetic path length
AL	4900	4900	nH/turns <sup>2</sup>	Ungapped core effective inductance
VE	3910.0	3910.0	mm <sup>3</sup>	Core volume
BOBBIN	EIQ30-10pinsBobbin	EIQ30-10pinsBobbin		Bobbin
AW	16.80	16.80	mm <sup>2</sup>	Window area of the bobbin - only the bobbin width and height are used to assess fit by the magnetics builder
BW	3.50	3.50	mm	Bobbin window width
BH		4.80	mm	Bobbin window height
MARGIN		0.0	mm	Safety margin width (Half the primary to secondary creepage distance)
<b>PRIMARY WINDING</b>				
NPRIMARY		73		Primary turns
BPEAK		3418	Gauss	Peak flux density
BMAX		2094	Gauss	Maximum flux density
BAC		1047	Gauss	AC flux density (0.5 x Peak to Peak)
ALG		233	nH/turns <sup>2</sup>	Typical gapped core effective inductance
<b>SECONDARY WINDING</b>				
NSECONDARY		7		Secondary turns
<b>BIAS WINDING</b>				
NBIAS		6		Bias turns

PRIMARY COMPONENTS SELECTION					
LINE UNDERVOLTAGE					
BROWN-IN REQUIRED			112.8	V	Required AC RMS line voltage brown-in threshold
RLS			5.74	MΩ	Connect two 2.87 MOhm resistors to the V-pin for the required UV/OV threshold
BROWN-IN ACTUAL			114.8	V	Actual AC RMS brown-in threshold
BROWN-OUT ACTUAL			103.8	V	Actual AC RMS brown-out threshold
LINE OVERVOLTAGE					
OVERVOLTAGE_LINE		Warning	479.4	V	The device voltage stress will be higher than 585V when overvoltage is triggered
BIAS DIODE					
VBIAS	9.0	Info	9.0	V	The rectified bias voltage maybe too low to supply the BP pin: Increase the rectified bias voltage to a value higher than 10V
VF_BIAS	0.70		0.70	V	Bias winding diode forward drop
VREVERSE_BIASDIODE			181.50	V	Bias diode reverse voltage (not accounting parasitic voltage ring)
CBIAS			22	uF	Bias winding rectification capacitor
CBPP			4.70	uF	BPP pin capacitor
SECONDARY COMPONENTS					
RFB_UPPER			100.00	kΩ	Upper feedback resistor (connected to the first output voltage)
RFB_LOWER			11.80	kΩ	Lower feedback resistor
CFB_LOWER			330	pF	Lower feedback resistor decoupling capacitor
MULTIPLE OUTPUT PARAMETERS					
OUTPUT 1					
VOUT1			12.00	V	Output 1 voltage
IOUT1			1.67	A	Output 1 current
POUT1			20.04	W	Output 1 power
IRMS_SECONDARY1			4.009	A	Root mean squared value of the secondary current for output 1
NSECONDARY1			7		Number of turns for output 1
VREVERSE_RECTIFIER1			213.25	V	SRFET reverse voltage (not accounting parasitic voltage ring) for output 1
SRFET1	Auto	Info	AON7254		The voltage stress (including the parasitic ring) on the secondary MOSFET selected may exceed the device BVDSS: pick a MOSFET with a higher BVDSS
VF_SRFET1			0.110	V	SRFET on-time drain voltage for output 1
VBREAKDOWN_SRFET1			150	V	SRFET breakdown voltage for output 1
RDSON_SRFET1			66.0	mΩ	SRFET on-time drain resistance at 25degC and VGS=4.4V for output 1
OUTPUT 2					
VOUT2			0.00	V	Output 2 voltage
IOUT2			0.000	A	Output 2 current
POUT2			0.00	W	Output 2 power
IRMS_SECONDARY2			0.000	A	Root mean squared value of the secondary current for output 2

NSECONDARY2			0		Number of turns for output 2
VREVERSE_RECTIFIER2			0.00	V	SRFET reverse voltage (not accounting parasitic voltage ring) for output 2
SRFET2	Auto		NA		Secondary rectifier (Logic MOSFET) for output 2
VF_SRFET2			NA	V	SRFET on-time drain voltage for output 2
VBREAKDOWN_SRFET2			NA	V	SRFET breakdown voltage for output 2
RDSON_SRFET2			NA	mΩ	SRFET on-time drain resistance at 25degC and VGS=4.4V for output 2
OUTPUT 3					
VOUT3			0.00	V	Output 3 voltage
IOUT3			0.000	A	Output 3 current
POUT3			0.00	W	Output 3 power
IRMS_SECONDARY3			0.000	A	Root mean squared value of the secondary current for output 3
NSECONDARY3			0		Number of turns for output 3
VREVERSE_RECTIFIER3			0.00	V	SRFET reverse voltage (not accounting parasitic voltage ring) for output 3
SRFET3	Auto		NA		Secondary rectifier (Logic MOSFET) for output 3
VF_SRFET3			NA	V	SRFET on-time drain voltage for output 3
VBREAKDOWN_SRFET3			NA	V	SRFET breakdown voltage for output 3
RDSON_SRFET3			NA	mΩ	SRFET on-time drain resistance at 25degC and VGS=4.4V for output 3
PO_TOTAL			20.04	W	Total power of all outputs
NEGATIVE OUTPUT	N/A		N/A		If negative output exists, enter the output number; e.g. If VO2 is negative output, select 2