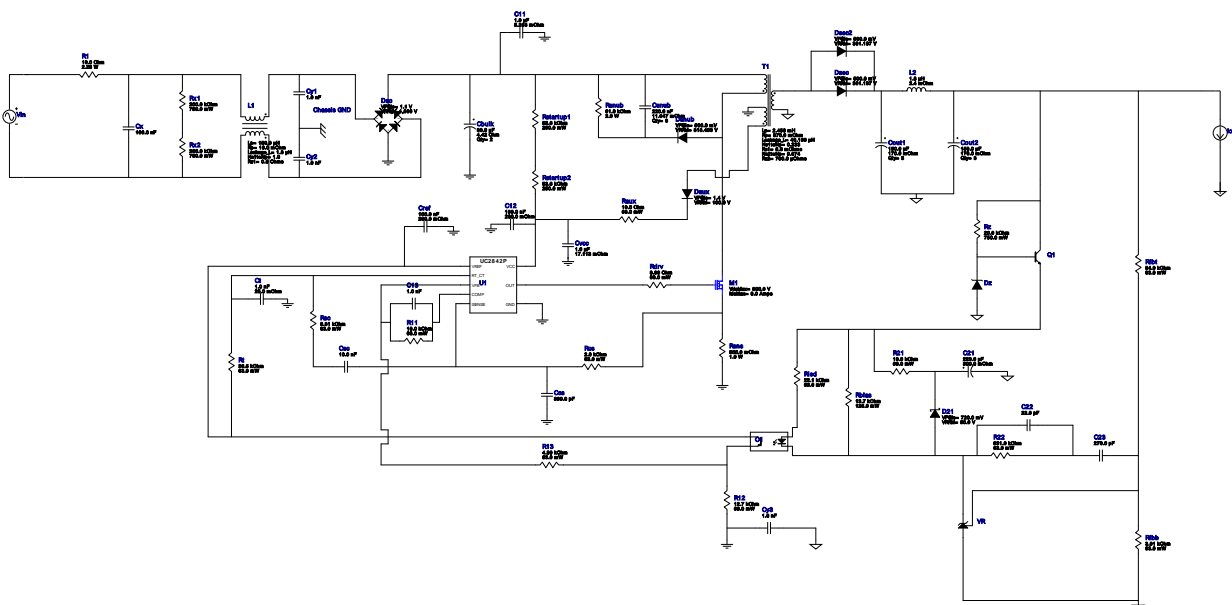


WEBENCH® Design Report

Design : 4466246/67 UC2842N
UC2842N 220.0V-220.0V to 48.00V @ 2.0A



1. The EMI filter selected here contains the estimated values. The real numbers will depend on the attenuation needed at a particular frequency.

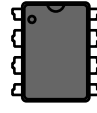

Electrical BOM

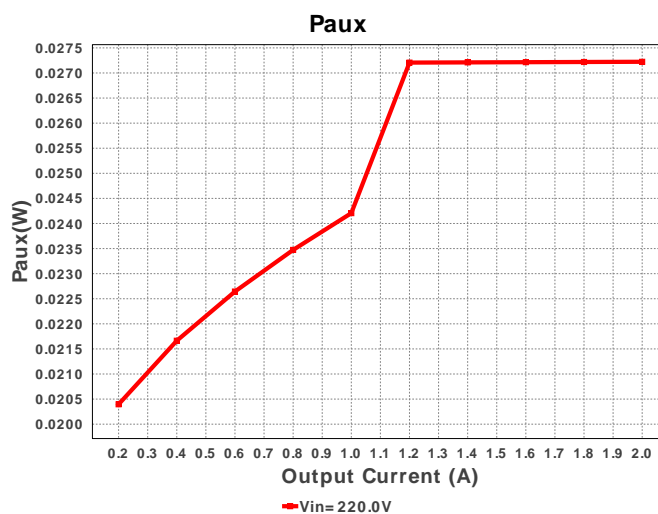
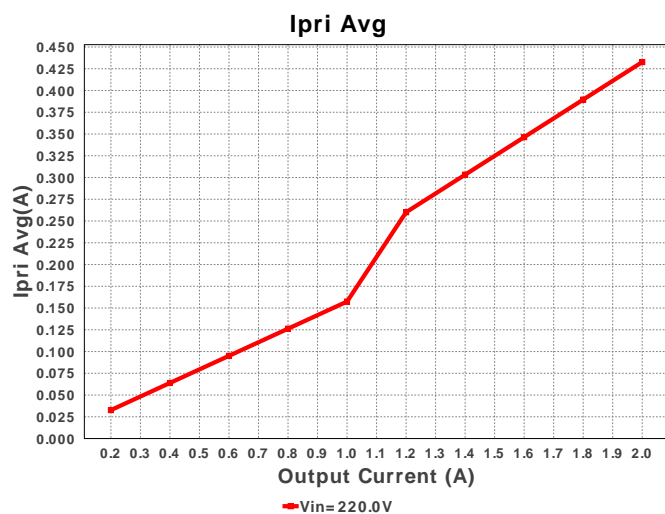
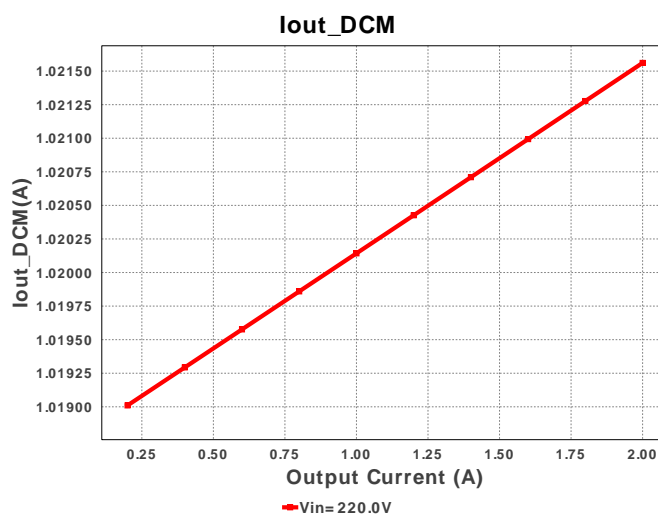
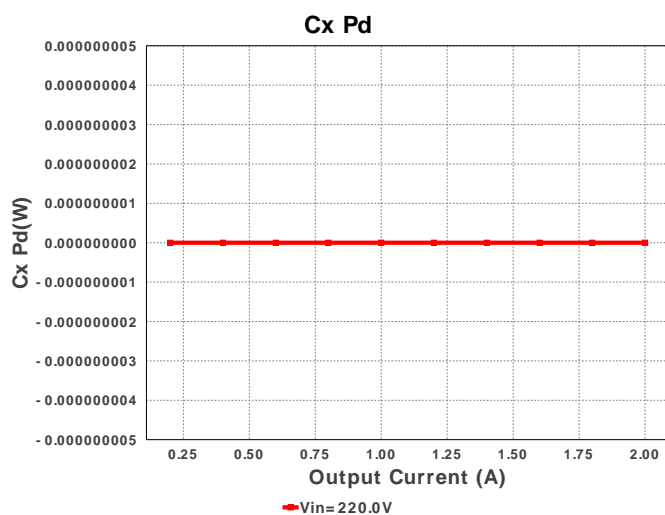
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C11	TDK	C5750X6S2W105K Series= X6S	Cap= 1.0 uF ESR= 5.263 mOhm VDC= 400.0 V IRMS= 0.0 A	1	\$1.19	 2220 54 mm ²
2.	C12	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
3.	C13	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
4.	C21	Chemi-Con	EMVY500ADA221MJA0G Series= MVY	Cap= 220.0 uF ESR= 300.0 mOhm VDC= 50.0 V IRMS= 500.0 mA	1	\$0.28	 CAPSMT_62_JA0 151 mm ²
5.	C22	Kemet	C0805C220K3GACTU Series= C0G/NP0	Cap= 22.0 pF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
6.	C23	Yageo America	CC0805KRX7R9BB271 Series= X7R	Cap= 270.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
7.	Cbulk	Cornell Dubilier Electronics	380LX330M500H012 Series= 380LX	Cap= 33.0 uF ESR= 4.42 Ohm VDC= 500.0 V IRMS= 600.0 mA	2	\$5.85	380LX_2200x2500 0 mm ²
8.	Ccs	Yageo America	CC0805KRX7R9BB391 Series= X7R	Cap= 390.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²

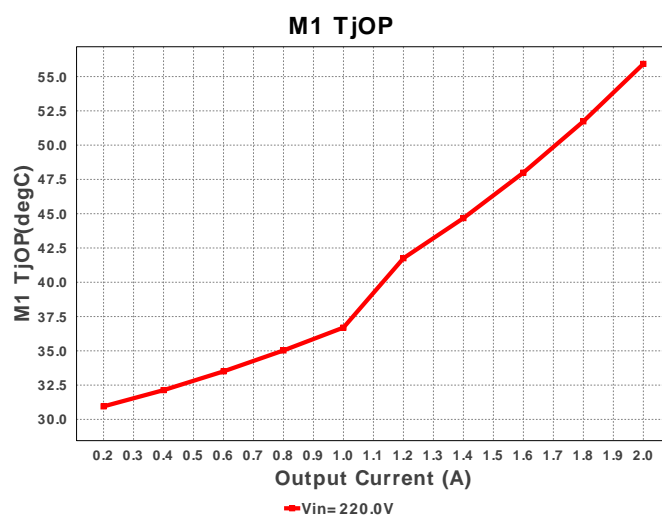
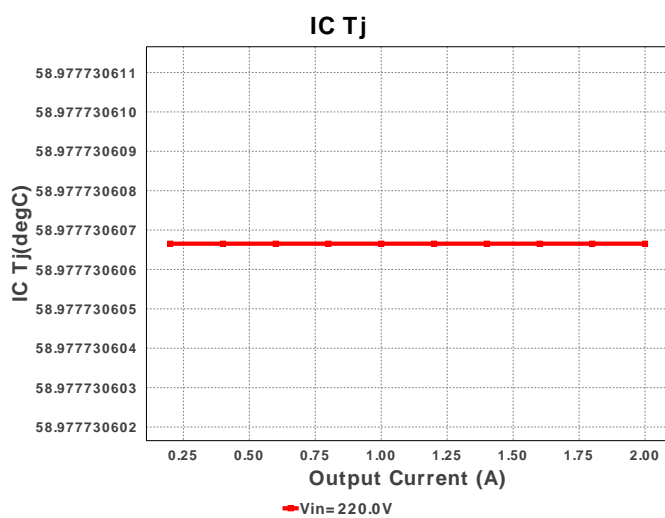
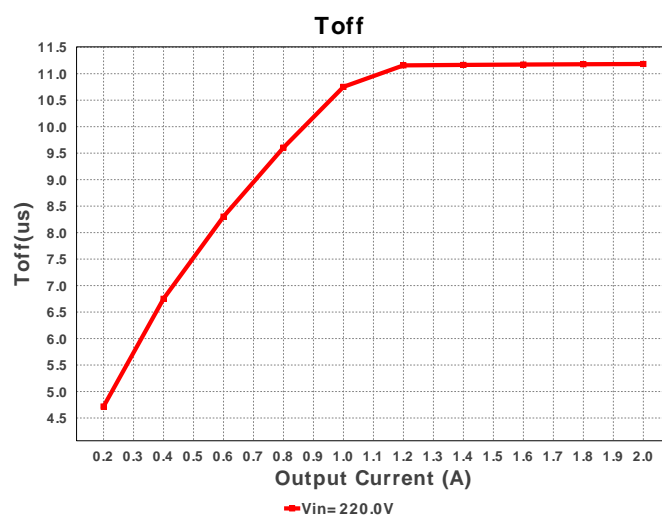
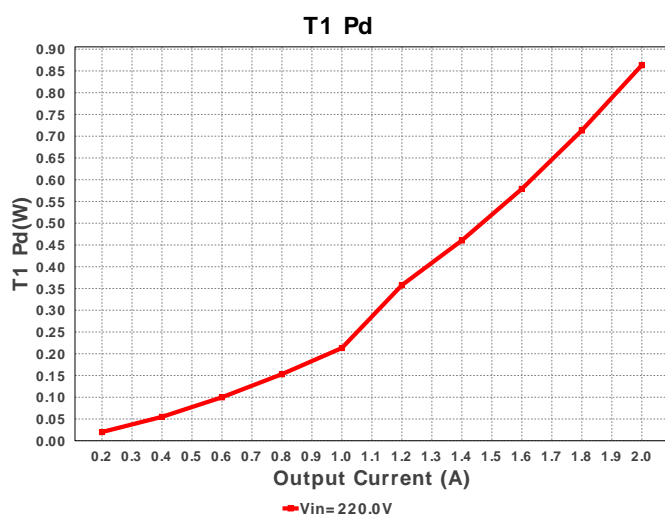
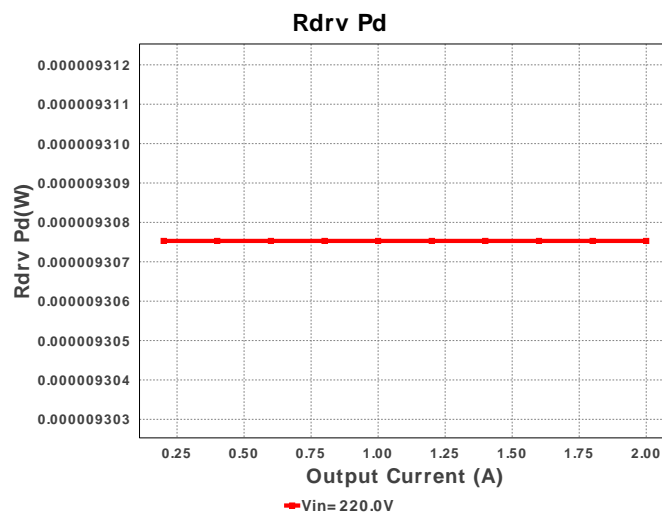
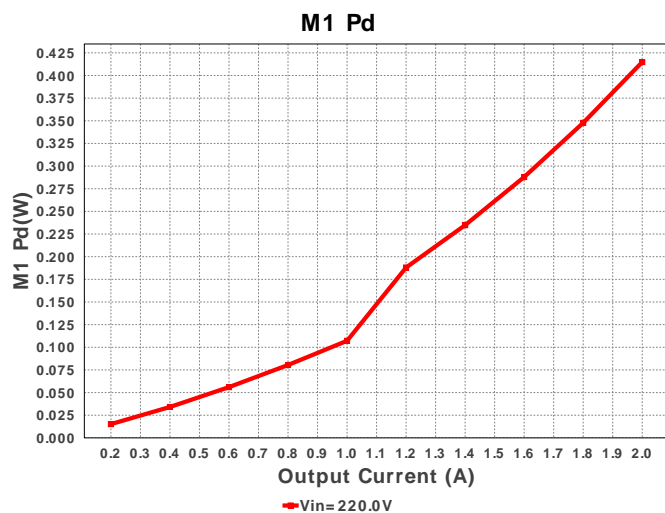
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cout1	Panasonic	EEV-FK2A151M Series= FK	Cap= 150.0 uF ESR= 170.0 mOhm VDC= 100.0 V IRMS= 793.0 mA	3	\$0.78	 SM_RADIAL_J16 399 mm ²
10.	Cout2	Panasonic	EEV-FK2A151M Series= FK	Cap= 150.0 uF ESR= 170.0 mOhm VDC= 100.0 V IRMS= 793.0 mA	3	\$0.78	 SM_RADIAL_J16 399 mm ²
11.	Cref	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
12.	Csc	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
13.	Csnub	TDK	C5750JB2J224K Series= JB	Cap= 220.0 nF ESR= 11.047 mOhm VDC= 630.0 V IRMS= 0.0 A	6	\$0.20	 2220 54 mm ²
14.	Ct	Kemet	C0805C102J5GACTU Series= C0G/NP0	Cap= 1.0 nF ESR= 25.0 mOhm VDC= 50.0 V IRMS= 1.71 A	1	\$0.01	 0805 7 mm ²
15.	Cvcc	MuRata	GRM188R61E105KA12D Series= X5R	Cap= 1.0 uF ESR= 17.113 mOhm VDC= 25.0 V IRMS= 979.39 mA	1	\$0.01	 0603 5 mm ²
16.	Cx	TDK	B32913A5104M000 Series= 2231	Cap= 100.0 nF VDC= 1000.0 V IRMS= 0.0 A	1	\$0.46	 B32913_2650x600x1500 228 mm ²
17.	Cy1	TDK	B81123C1102M Series= B81123	Cap= 1.0 nF VDC= 3.0 kV IRMS= 0.0 A	1	\$0.22	 B81123_1800x500x1050 140 mm ²
18.	Cy2	TDK	B81123C1102M Series= B81123	Cap= 1.0 nF VDC= 3.0 kV IRMS= 0.0 A	1	\$0.22	 B81123_1800x500x1050 140 mm ²

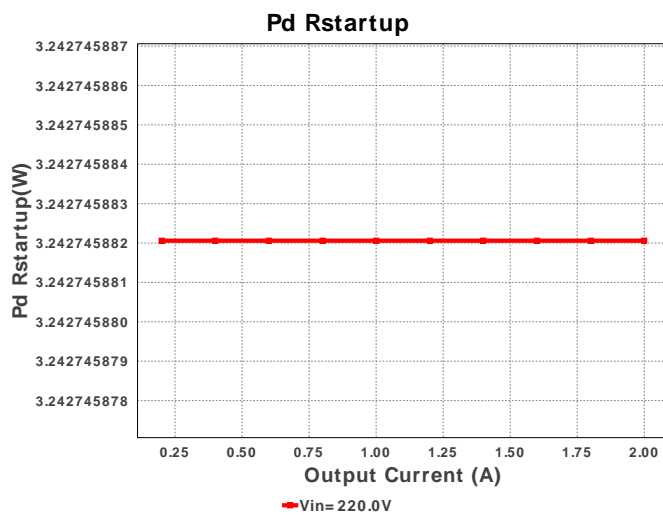
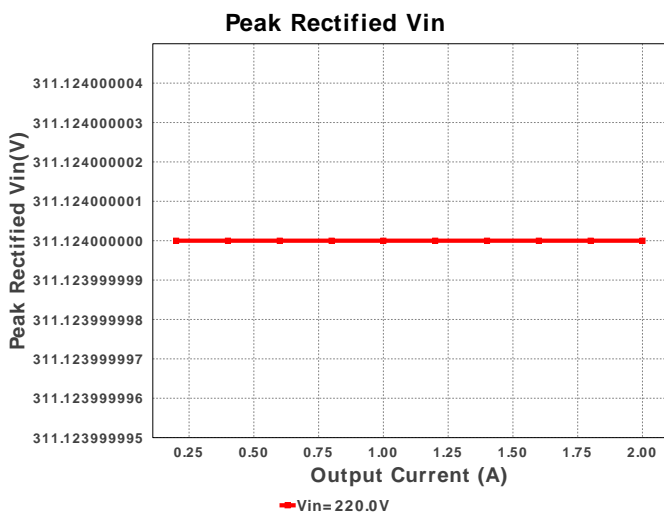
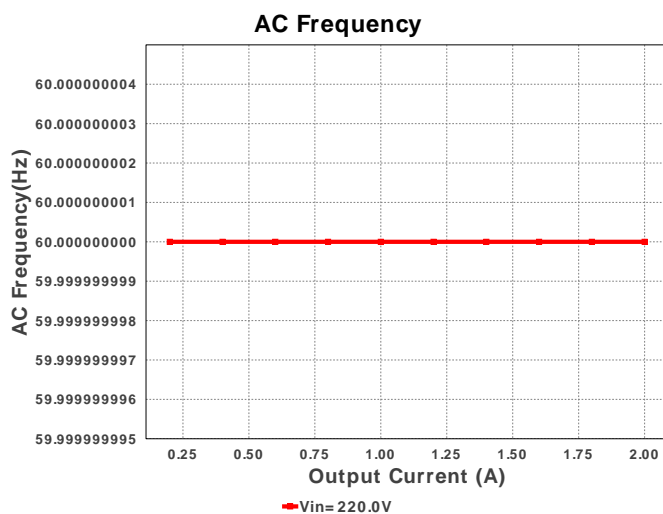
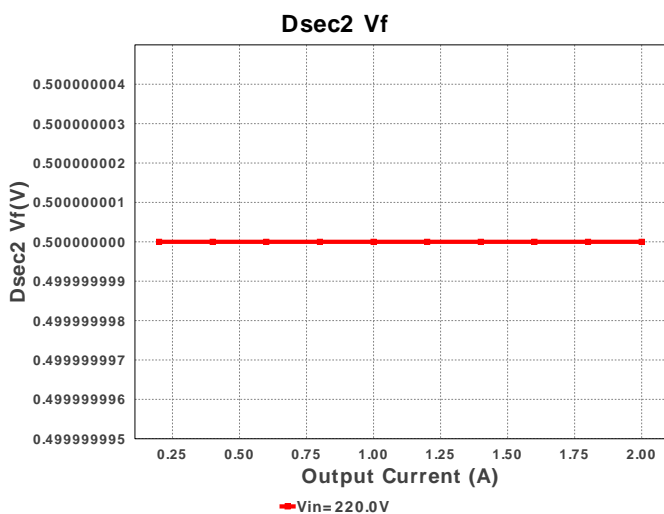
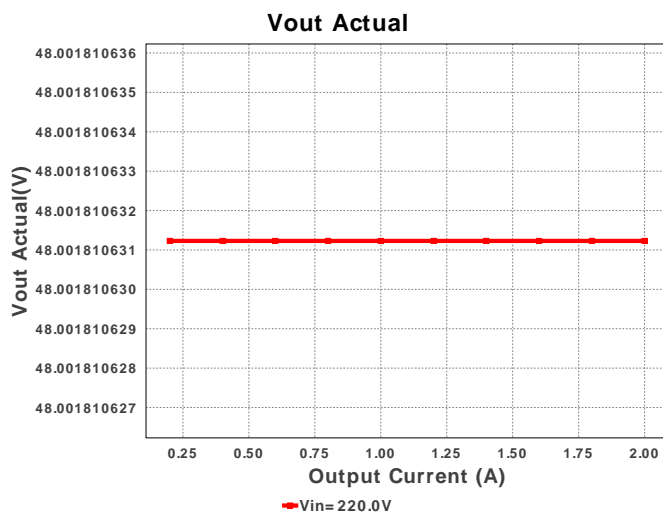
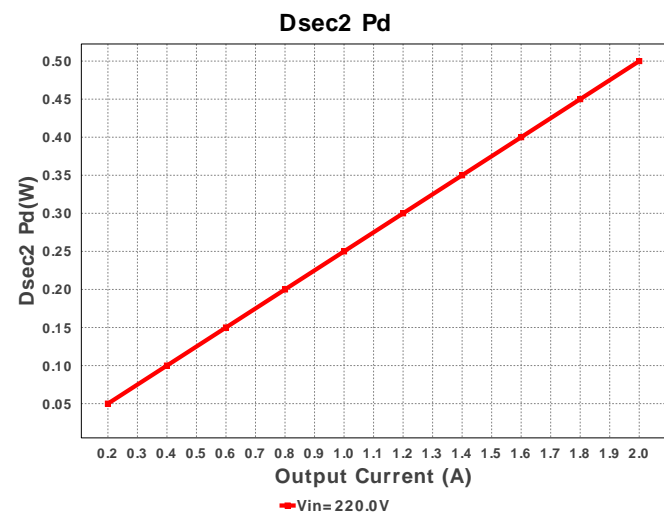
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
19.	Cy3	TDK	B81123C1102M Series= B81123	Cap= 1.0 nF VDC= 3.0 kV IRMS= 0.0 A	1	\$0.22	 B81123_1800x500x1050 140 mm ²
20.	D21	ON Semiconductor	SS16T3G	VF@Io= 720.0 mV VRRM= 60.0 V	1	\$0.08	 SMA 37 mm ²
21.	Dac	Vishay-Semiconductor	DF10SA	VF@Io= 1.1 V VRRM= 1,000.0 V	1	\$0.24	 DF-S 99 mm ²
22.	Daux	NXP Semiconductor	BAS316,115	VF@Io= 1.4 V VRRM= 100.0 V	1	\$0.02	 SOD-323 9 mm ²
23.	Dsec	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 301.197 V	1	NA	CUSTOM 0 mm ²
24.	Dsec2	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 301.197 V	1	NA	CUSTOM 0 mm ²
25.	Dsnub	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 818.409 V	1	NA	CUSTOM 0 mm ²
26.	Dz	Diodes Inc.	MMSZ5250B-7-F	Zener	1	\$0.03	 SOD-123 13 mm ²
27.	L1	API Delevan	CM6296R-154	Lp= 150.0 µH Rp= 16.0 mOhm Leakage_L= 1.8 µH Ns1toNp= 1.0 Rs1= 0.0 Ohms	1	\$5.95	 CM6296 833 mm ²
28.	L2	Coilcraft	SER1360-182KLB	L= 1.8 µH DCR= 2.4 mOhm	1	\$0.72	 SER1360 225 mm ²
29.	M1	STMicroelectronics	STF10N80K5	VdsMax= 800.0 V IdsMax= 9.0 Amps	1	\$2.52	 TO-220FP 79 mm ²
30.	O1	Vishay-Semiconductor	TCMT1107	Optocoupler	1	\$0.21	 SOP-4 44 mm ²
31.	Q1	ON Semiconductor	BC846BLT1G	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm ²
32.	R1	Vishay-Dale	AC03000001009JACCS Series= F_RES	Res= 10.0 Ohm Power= 2.25 W Tolerance= 5.0%	1	\$0.30	 AC03 158 mm ²
33.	R11	Vishay-Dale	CRCW040210K0FKED Series= CRCW...e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
34.	R12	Vishay-Dale	CRCW040212K7FKED Series= CRCW..e3	Res= 12.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
35.	R13	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
36.	R21	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
37.	R22	Vishay-Dale	CRCW0402931KFKED Series= CRCW..e3	Res= 931.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
38.	Raux	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
39.	Rbias	Panasonic	ERJ-6ENF1372V Series= ERJ-6E	Res= 13.7 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
40.	Rcs	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
41.	Rdrv	Vishay-Dale	CRCW04028R66FKED Series= CRCW..e3	Res= 8.66 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
42.	Rfbb	Vishay-Dale	CRCW04023K01FKED Series= CRCW..e3	Res= 3.01 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
43.	Rfbt	Vishay-Dale	CRCW040254K9FKED Series= CRCW..e3	Res= 54.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
44.	Rled	Vishay-Dale	CRCW040222K1FKED Series= CRCW..e3	Res= 22.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
45.	Rsc	Vishay-Dale	CRCW04029K31FKED Series= CRCW..e3	Res= 9.31 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
46.	Rsns	Stackpole Electronics Inc	CSRN2010FKR500 Series= ?	Res= 500.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	\$0.10	 2010 32 mm²
47.	Rsns	Vishay-Bccomponents	PR02000209102JR500 Series= ?	Res= 91.0 kOhm Power= 2.0 W Tolerance= 5.0%	1	\$0.05	PR02 113 mm²
48.	Rstartup1	Panasonic	ERJ-8ENF5362V Series= ERJ-8E	Res= 53.6 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
49.	Rstartup2	Panasonic	ERJ-8ENF5362V Series= ERJ-8E	Res= 53.6 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
50.	Rt	Vishay-Dale	CRCW040236K5FKED Series= CRCW..e3	Res= 36.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
51.	Rx1	Vishay-Semiconductor	CRCW2010200KFKEF Series= ?	Res= 200.0 kOhm Power= 750.0 mW Tolerance= 1.0%	1	\$0.03	 2010 32 mm²
52.	Rx2	Vishay-Semiconductor	CRCW2010200KFKEF Series= ?	Res= 200.0 kOhm Power= 750.0 mW Tolerance= 1.0%	1	\$0.03	 2010 32 mm²
53.	Rz	Vishay-Dale	CRCW201020K0KFKEF Series= CRCW..e3	Res= 20.0 kOhm Power= 750.0 mW Tolerance= 1.0%	1	\$0.03	 2010 32 mm²

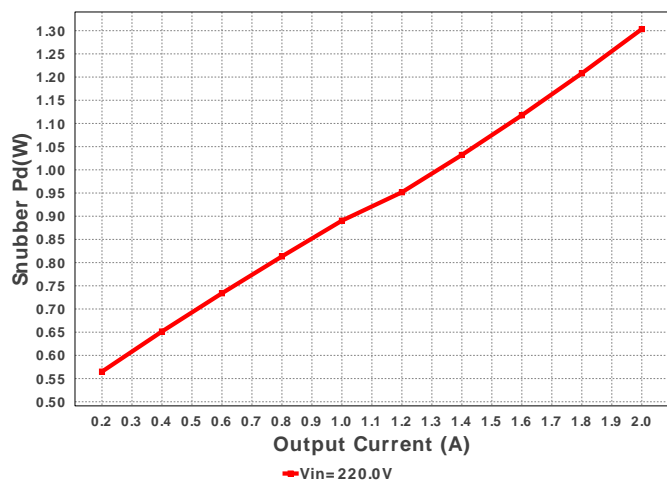
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
54. T1	CUSTOM	CUSTOM		Lp= 2.458 mH Rp= 870.0 mOhm Leakage_L= 49.168 μ H Ns1toNp= 0.233 Rs1= 8.6 mOhms Ns2toNp= 0.074 Rs2= 700.0 μ Ohms	1	NA	CUSTOM 0 mm ²
55. U1	Texas Instruments	UC2842N		Switcher	1	\$0.64	 P0008A 116 mm ²
56. VR	Texas Instruments	TL431AIDBVR		Voltage References	1	\$0.07	 R-PDSO-G3 16 mm ²



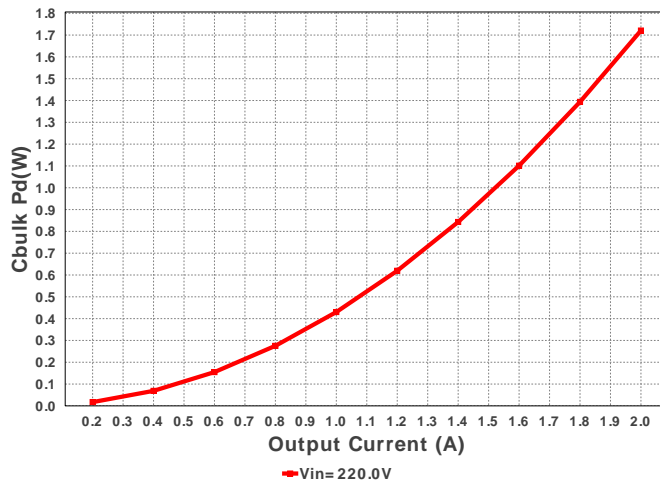




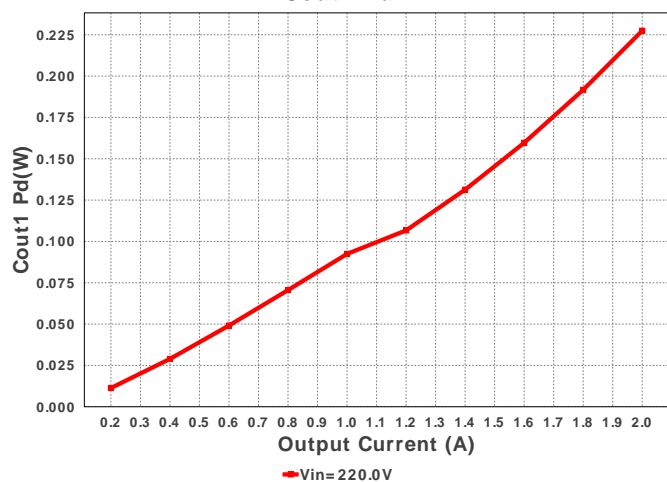
Snubber Pd



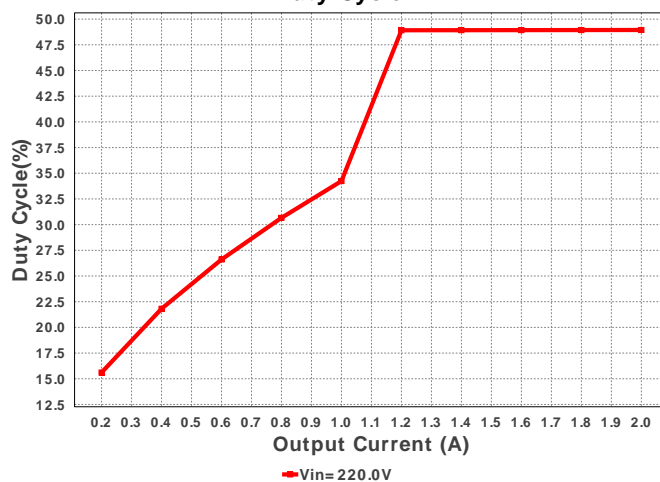
Cbulk Pd



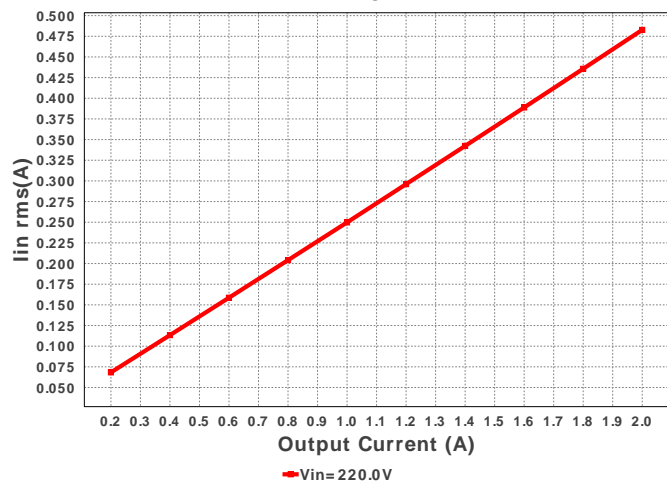
Cout1 Pd



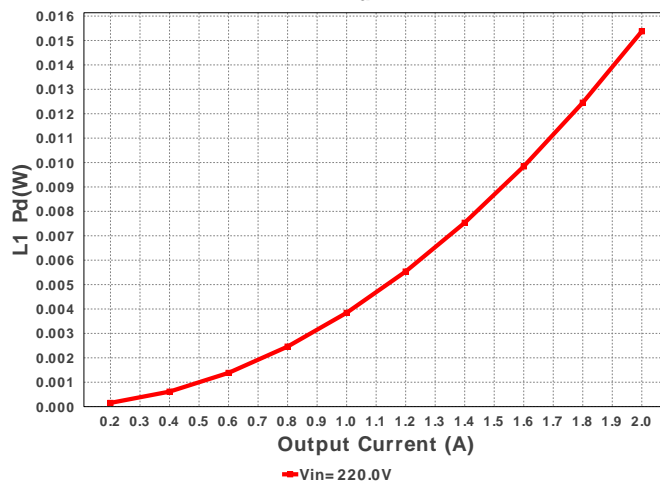
Duty Cycle

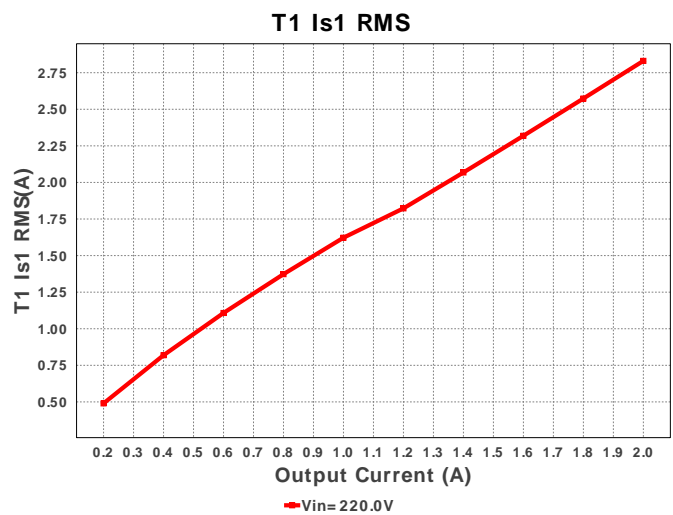
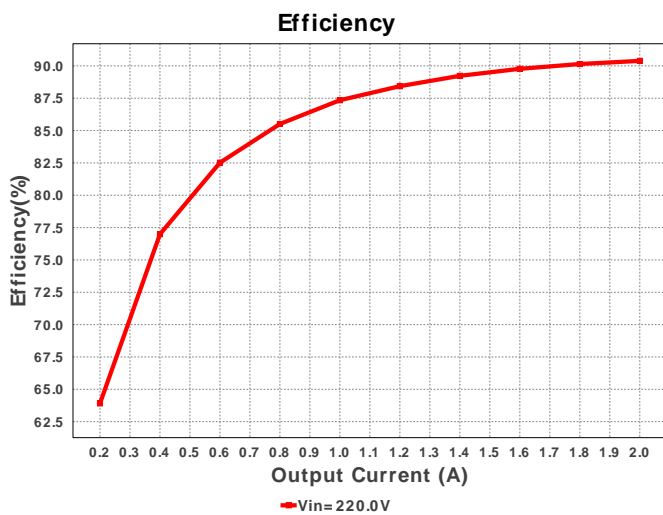
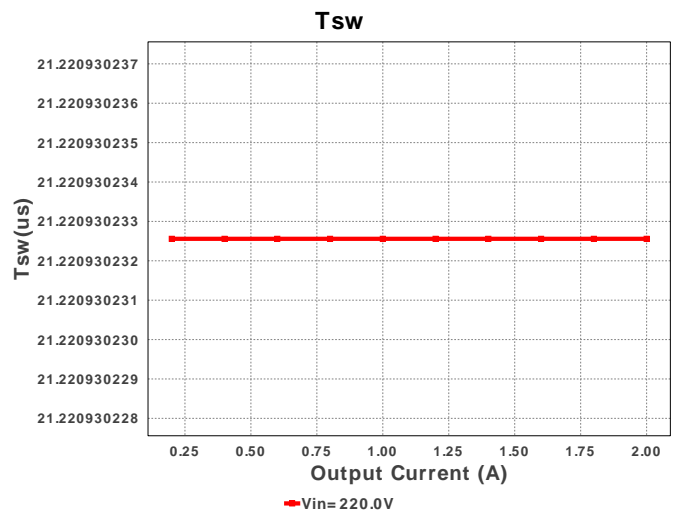
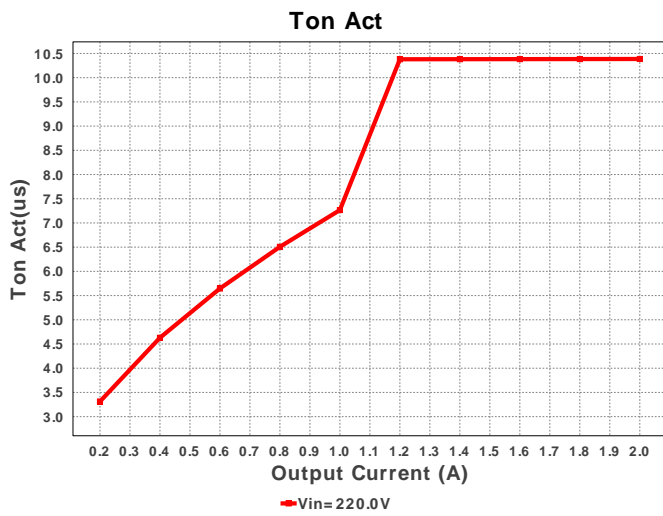
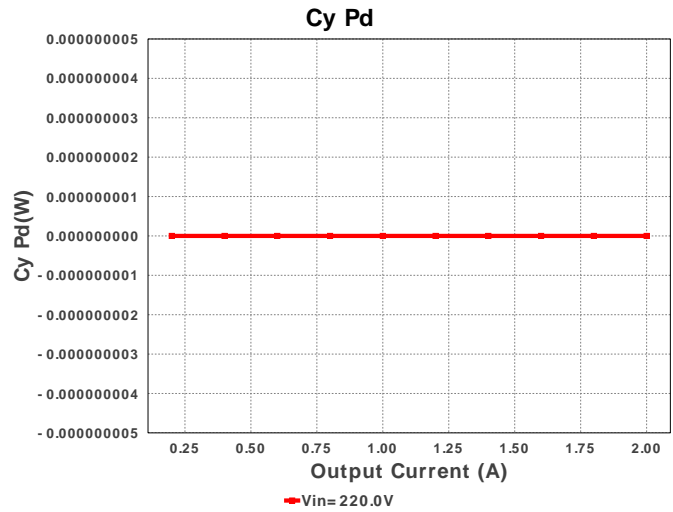
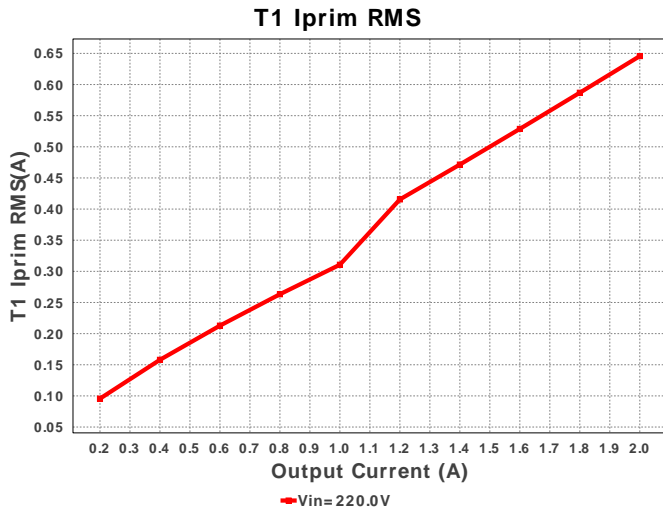


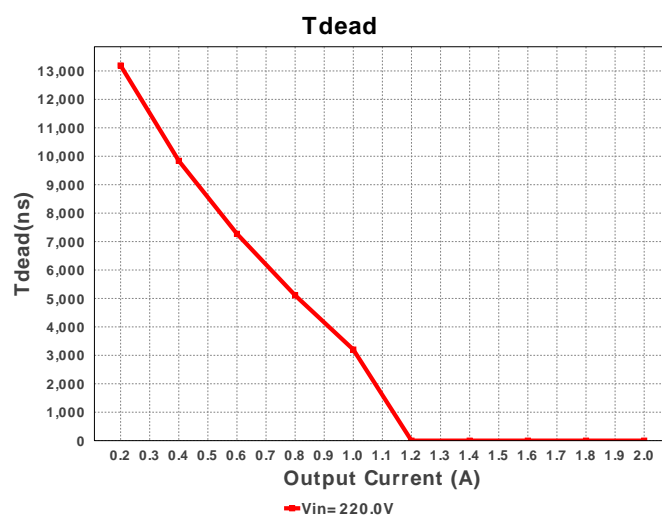
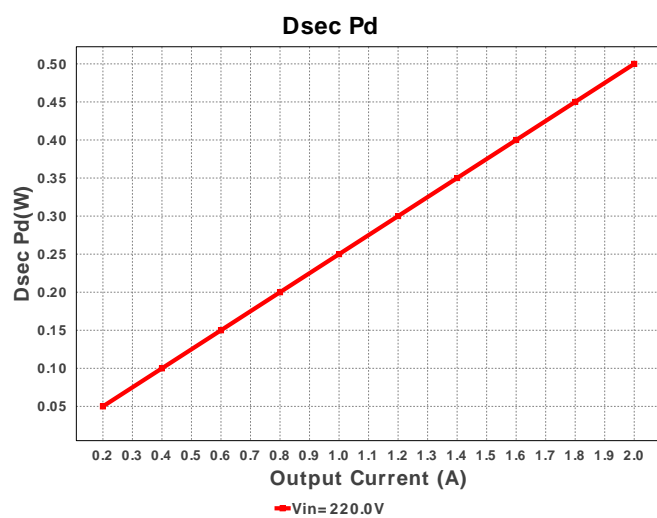
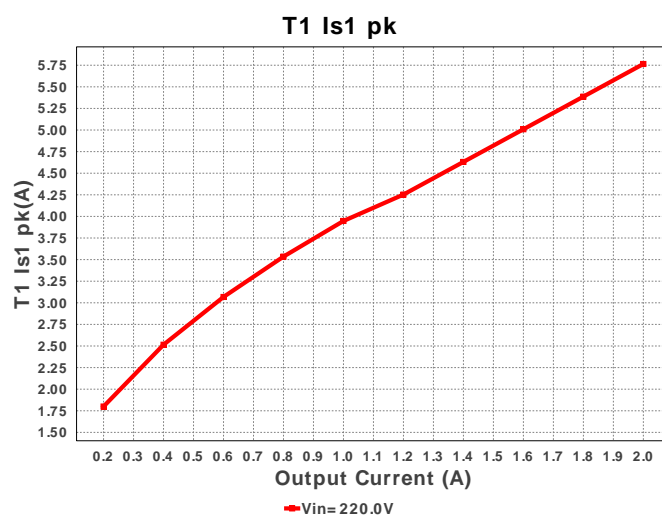
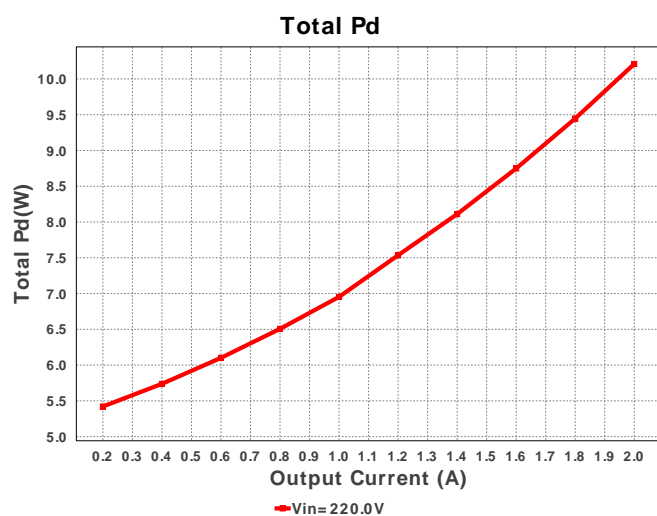
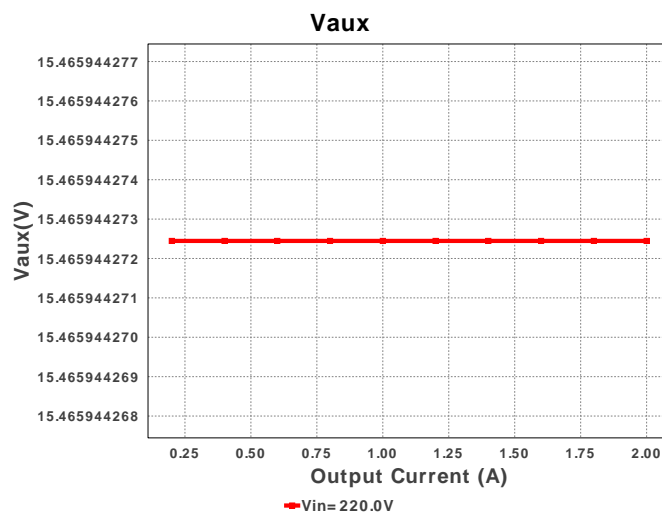
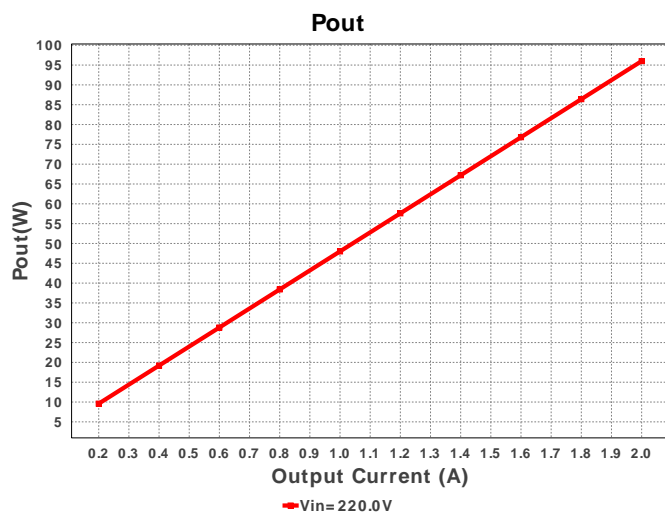
Iin rms



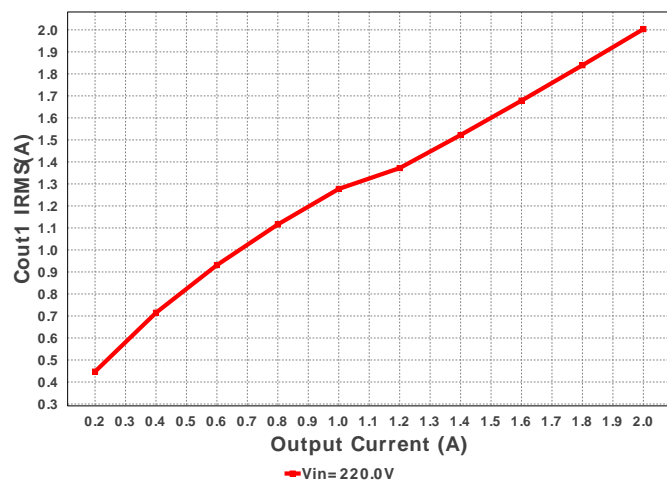
L1 Pd



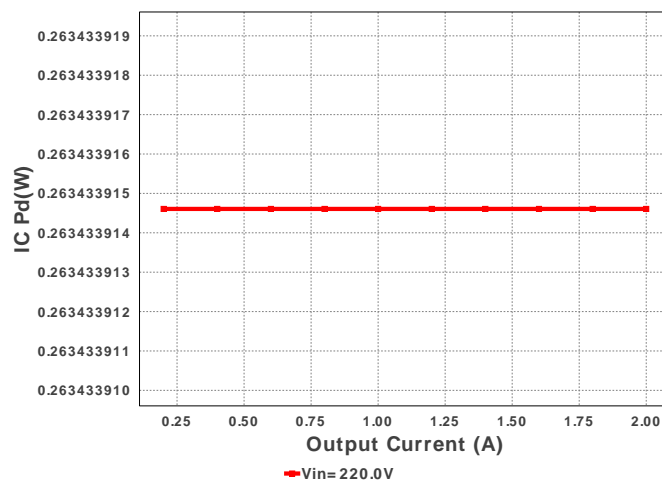




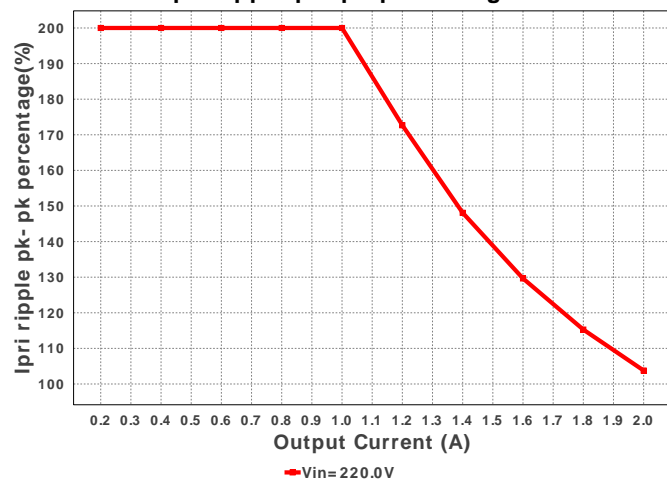
Cout1 IRMS



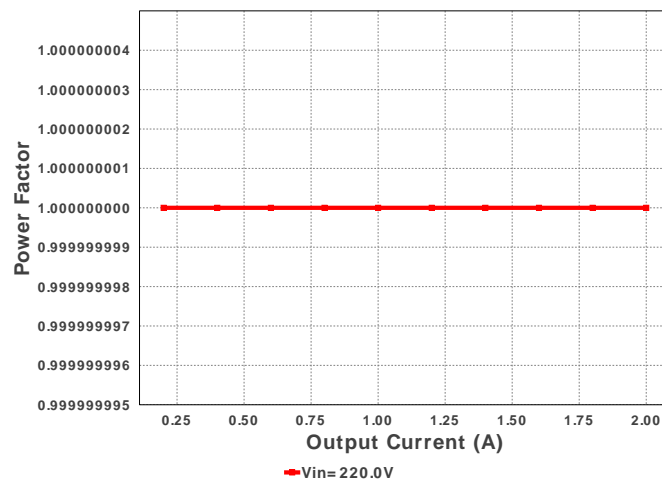
IC Pd



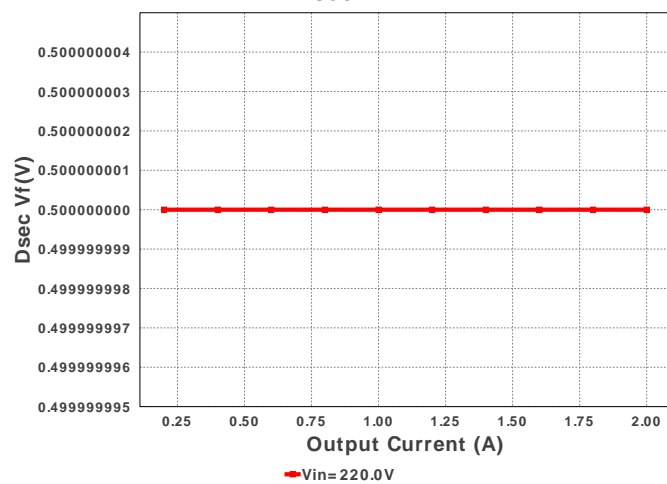
Ipri ripple pk- pk percentage



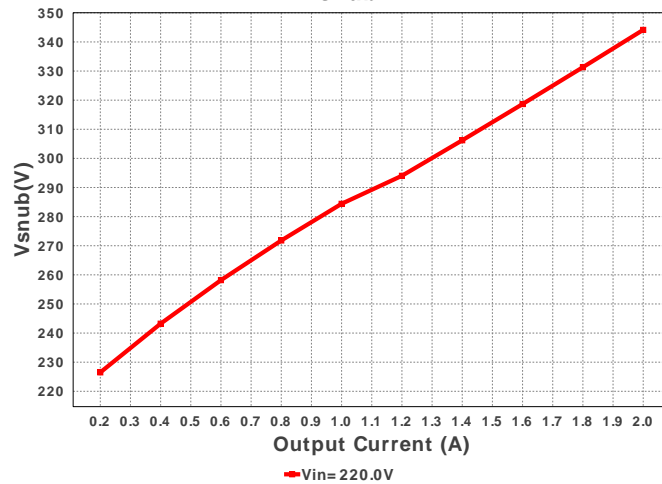
Power Factor

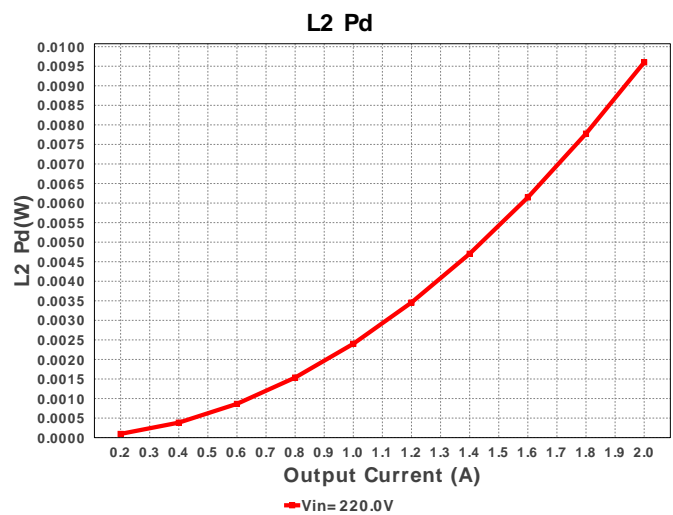
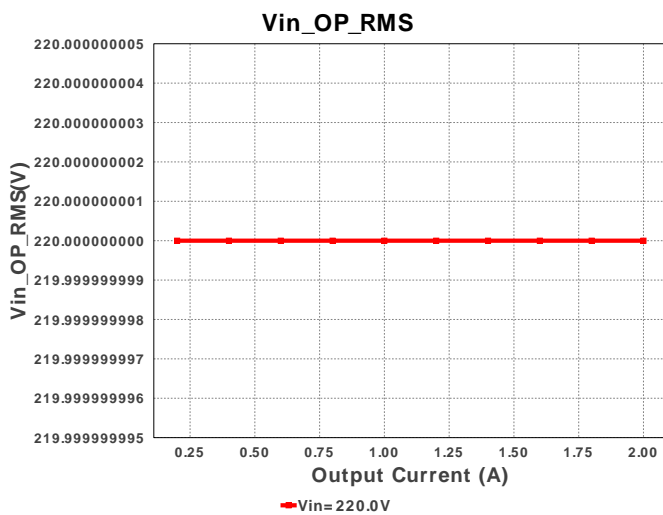
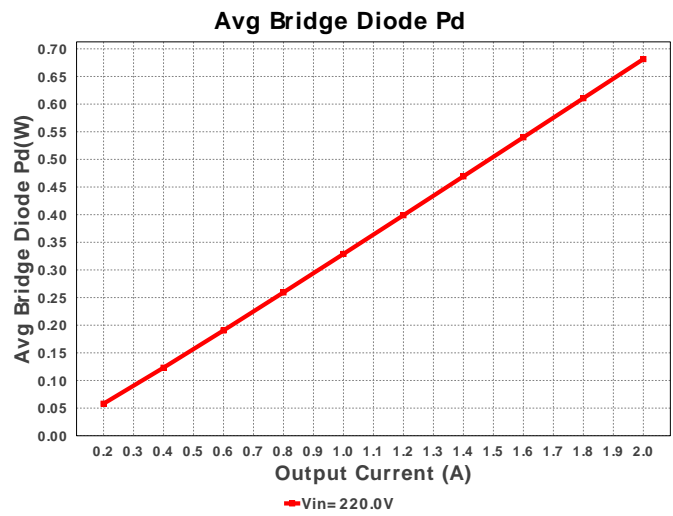
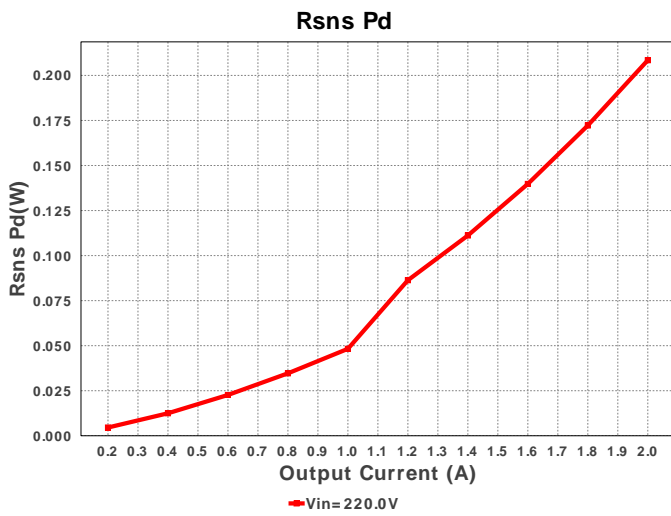
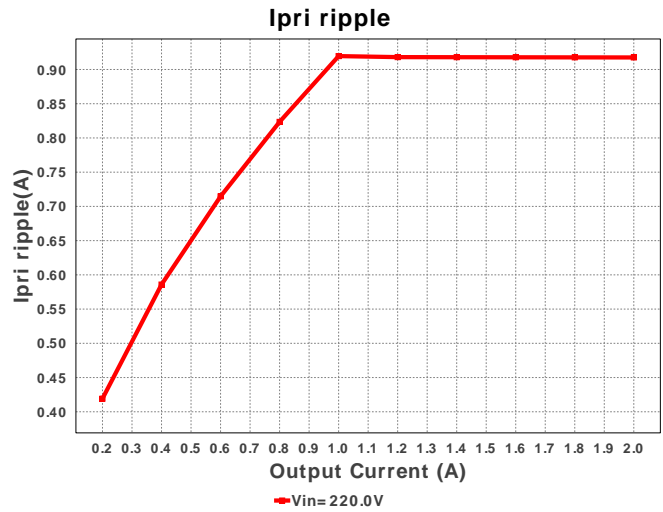
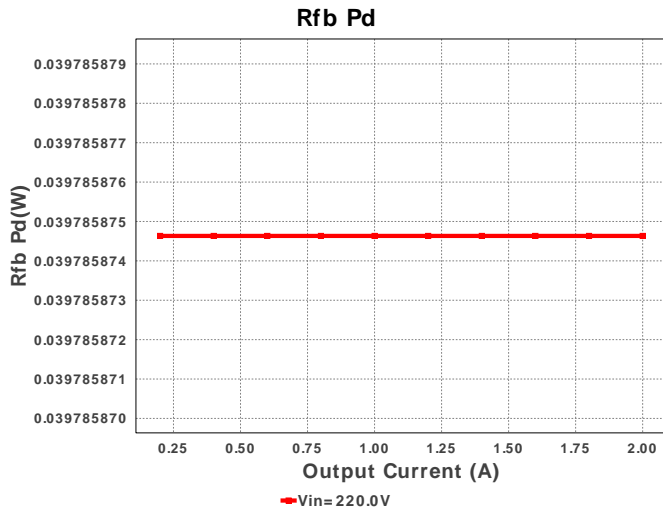


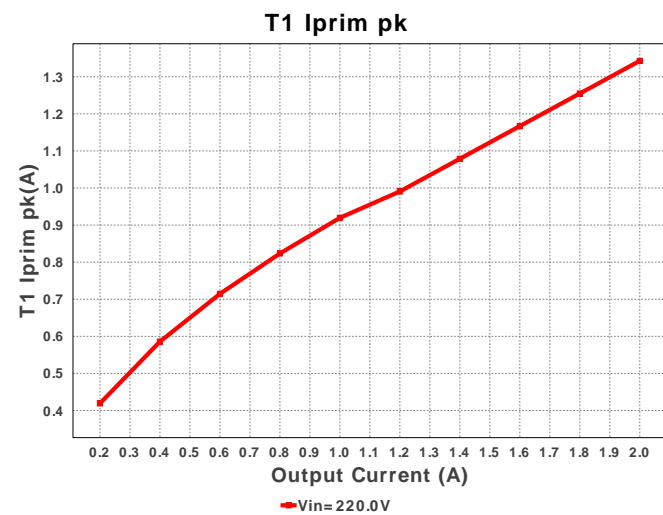
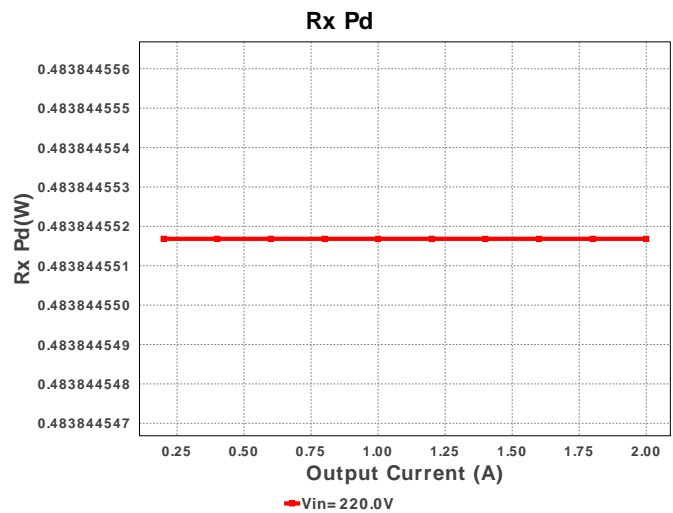
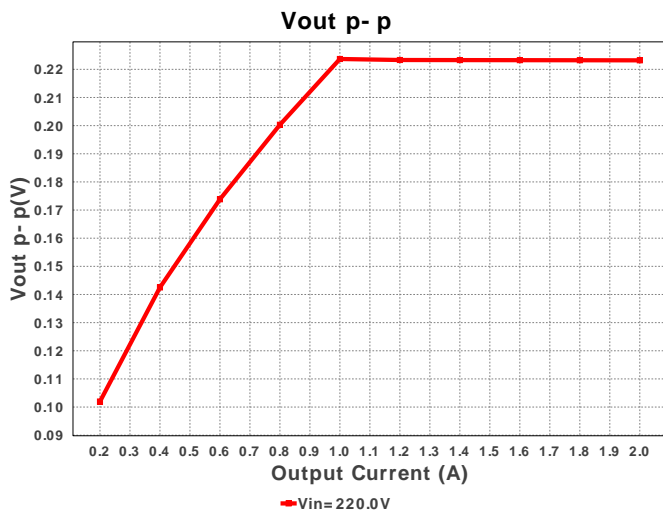
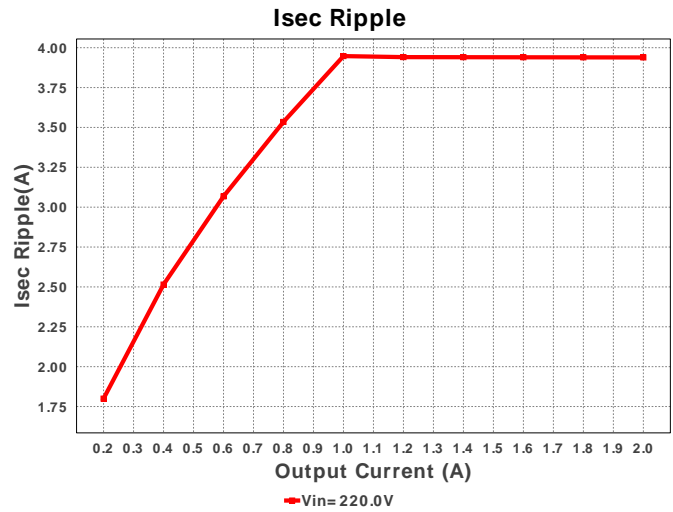
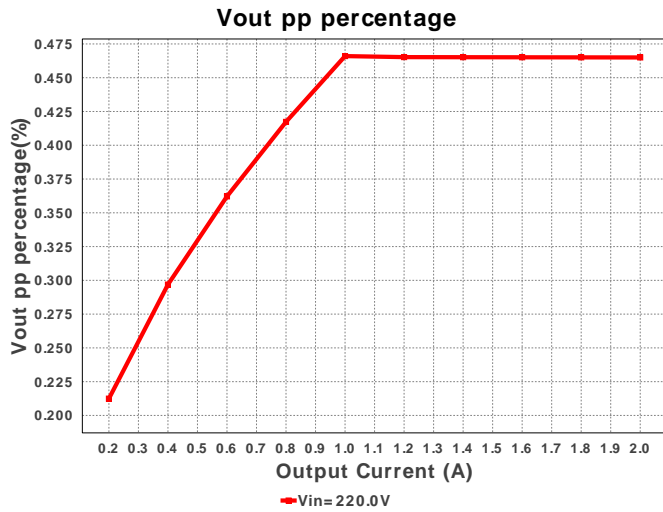
Dsec Vf



VsnuB







Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	2.003 A	Current	Output capacitor1 RMS ripple current
2.	Iin rms	482.77 mA	Current	RMS Input Current
3.	Iout_DCM	1.022 A	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	432.689 mA	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	917.569 mA	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	103.787 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	3.939 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	645.657 mA	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	1.343 A	Current	Transformer Primary Peak Current

#	Name	Value	Category	Description
10.	T1 Is1 RMS	2.831 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	5.764 A	Current	Transformer Secondary1 Peak Current
12.	AC Frequency	50.0 Hz	General	Input AC frequency
13.	BOM Count	66	General	Total Design BOM count
14.	Daux trr	4.0 ns	General	Auxiliary Diode Reverse Recovery Time
15.	Dsec Vf	500.0 mV	General	Effective Forward Voltage Drop at the Operating Current
16.	Dsec trr	60.0 ns	General	Output Diode Reverse Recovery Time
17.	Dsec2 Vf	500.0 mV	General	Effective Forward Voltage Drop at the Operating Current
18.	Dsnub trr	60.0 ns	General	Snubber Diode Reverse Recovery Time
19.	FootPrint	5.603 k mm ²	General	Total Foot Print Area of BOM components
20.	Frequency	47.123 kHz	General	Switching frequency
21.	Pout	96.0 W	General	Total output power
22.	Power Factor	1.0	General	Assumed Power Factor for the Application
23.	Tdead	0.0 ns	General	Approximate Dead Time of the Regulator
24.	Toff	11.183 us	General	Approximate Converter Off Time
25.	Ton Act	10.386 us	General	Approximate Converter On Time
26.	Total BOM	\$0.0	General	Total BOM Cost
27.	Tsw	21.221 us	General	Switching Time Period
28.	Vaux	15.466 V	General	Auxiliary Voltage
29.	Vsnub	344.147 V	General	Voltage Across the Snubber
30.	Vout Actual	48.002 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
31.	Vout OP	48.0 V	Op_Point	Operational Output Voltage
32.	Duty Cycle	48.942 %	Op_point	Duty cycle
33.	Efficiency	90.388 %	Op_point	Steady state efficiency
34.	IC Tj	58.978 degC	Op_point	IC junction temperature
35.	ICThetaJA	110.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
36.	IOUT_OP	2.0 A	Op_point	Iout operating point
37.	M1 TJOP	55.926 degC	Op_point	M1 MOSFET junction temperature
38.	Peak Rectified Vin	311.124 V	Op_point	Peak voltage seen at rectified input
39.	Vin_OP_RMS	220.0 V	Op_point	AC Input RMS Voltage
40.	Vout p-p	223.198 mV	Op_point	Peak-to-peak output ripple voltage
41.	Avg Bridge Diode Pd	681.457 mW	Power	Average Power Dissipation in the Bridge Diode over the AC Line Period
42.	Cbulk Pd	1.721 W	Power	Bulk capacitor power dissipation
43.	Cout1 Pd	227.443 mW	Power	Output capacitor1 power dissipation
44.	Cx Pd	0.0 W	Power	X-cap Power Dissipation
45.	Cy Pd	0.0 W	Power	Y-caps Power Dissipation
46.	Dsec Pd	500.0 mW	Power	Secondary Diode Power Dissipation
47.	Dsec2 Pd	500.0 mW	Power	Secondary Diode Power Dissipation
48.	IC Pd	263.434 mW	Power	IC power dissipation
49.	L1 Pd	15.376 mW	Power	Power Dissipation in the Inductor
50.	L2 Pd	9.6 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
51.	M1 Pd	414.814 mW	Power	M1 MOSFET total power dissipation
52.	Paux	27.223 mW	Power	Power Dissipation in Raux and Daux
53.	Pd Rstartup	3.243 W	Power	Power Dissipation in Rstartup1 and Rstartup2
54.	Rdrv Pd	9.308 μW	Power	Power Dissipation in Gate Drive Resistor
55.	Rfb Pd	39.786 mW	Power	Rfb Power Dissipation
56.	Rsns Pd	208.436 mW	Power	Current Limit Sense Resistor Power Dissipation
57.	Rx Pd	483.845 mW	Power	Total Power Dissipation in Rx1 and Rx2
58.	Snubber Pd	1.303 W	Power	Snubber Power Dissipation
59.	T1 Pd	863.195 mW	Power	Estimated Losses in Transformer
60.	Total Pd	10.209 W	Power	Total Power Dissipation
61.	Vout Tolerance	2.242 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
62.	Vout pp percentage	464.996 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	220.0	Maximum input voltage
3.	VinMin	220.0	Minimum input voltage
4.	Vout	48.0	Output Voltage
5.	line_fsw	50.0	Light Output in Lumen
6.	base_pn	UC2842	Base Product Number
7.	source	AC	Input Source Type
8.	Ta	30.0	Ambient temperature

Design Assistance

1. **UC2842** Product Folder : <http://www.ti.com/product/UC2842> : contains the data sheet and other resources.

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