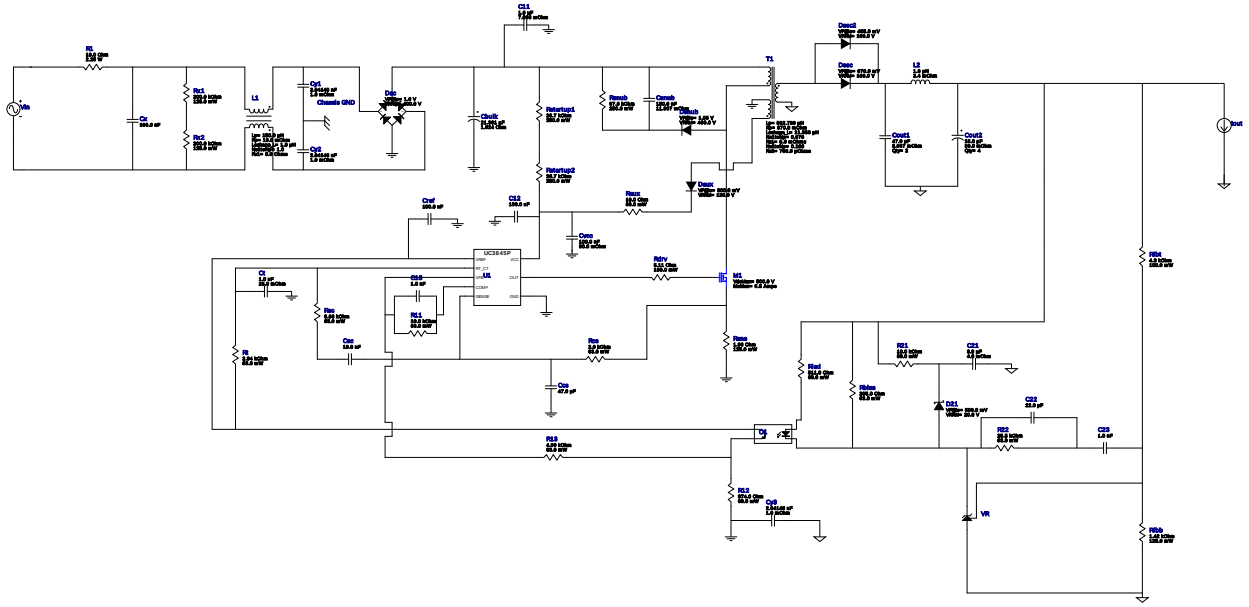
VinMin = 110.0V
VinMax = 130.0V
Vout = 5.0V
Iout = 2.0A

Device = UC3845N
Topology = Flyback
Created = 8/9/16 2:06:43 AM
BOM Cost = $0.00
BOM Count = 57
Total Pd = 3.28W

WEBENCH® Design Report

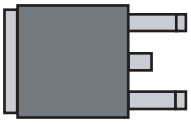
Design : 4352199/76 UC3845N
UC3845N 110.0V-130.0V to 5.00V @ 2.0A

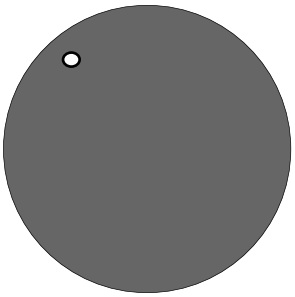
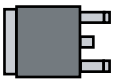


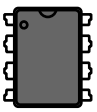
1. The EMI filter selected here contains the estimated values. The real numbers will depend on the attenuation needed at a particular frequency.

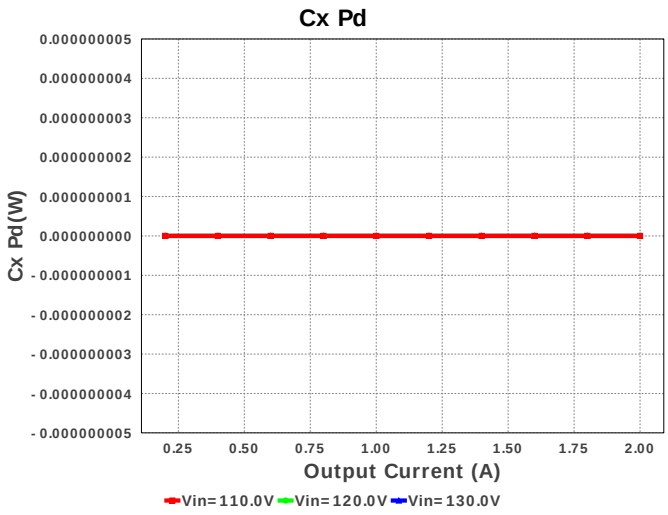
Electrical BOM

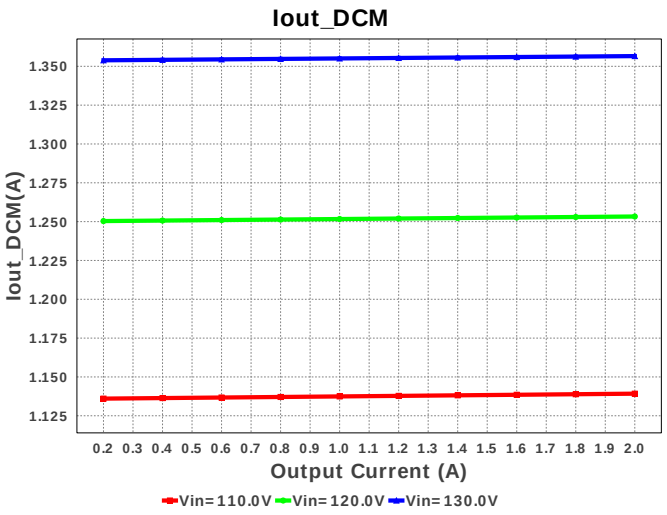
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C11	MuRata	GRM55DR72E105KW01L Series= X7R	Cap= 1.0 uF ESR= 7.086 mOhm VDC= 250.0 V IRMS= 2.0605 A	1	$0.26	2220_200 54 mm^2
2.	C12	MuRata	GRM155R61C104KA88D Series= X5R	Cap= 100.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	C13	MuRata	GRM033R71C102KA01D Series= X7R	Cap= 1.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2
4.	C21	Kemet	C0805C395K8PACTU Series= X5R	Cap= 3.9 uF ESR= 4.0 mOhm VDC= 10.0 V IRMS= 8.5 A	1	$0.11	0805 7 mm^2
5.	C22	MuRata	GRM0225C1C220JD05L Series= C0G/NP0	Cap= 22.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	01005 2 mm^2
6.	C23	MuRata	GRM033R71C102KA01D Series= X7R	Cap= 1.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2
7.	Cbulk	CUSTOM	CUSTOM Series= ?	Cap= 21.361 uF ESR= 1.924 Ohm VDC= 220.62 V IRMS= 220.6 mA	1	NA	CUSTOM 0 mm^2
8.	Ccs	Samsung Electro-Mechanics	CL02C470JO2ANNC Series= C0G/NP0	Cap= 47.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	01005 2 mm^2

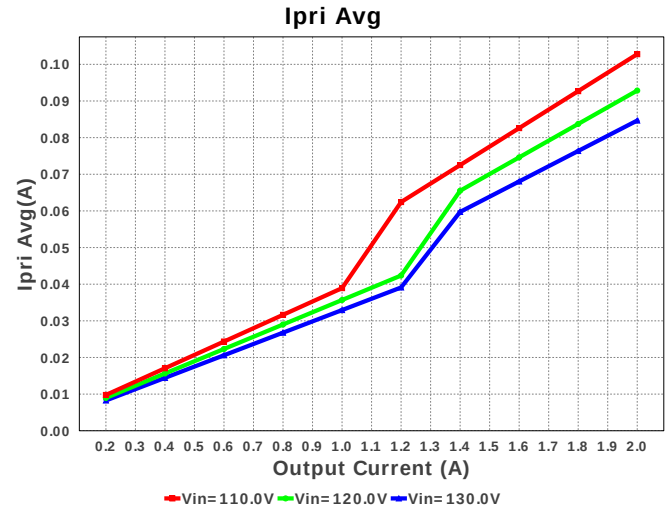
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cout1	MuRata	GRM32ER61A476KE20L Series= X5R	Cap= 47.0 uF ESR= 3.037 mOhm VDC= 10.0 V IRMS= 4.6162 A	2	$0.24	 1210_280 15 mm²
10.	Cout2	Panasonic	25SVPG15M Series= ?	Cap= 15.0 uF ESR= 30.0 mOhm VDC= 25.0 V IRMS= 2.8 A	4	$0.43	 CAPSMT_62_B45 53 mm²
11.	Cref	MuRata	GRM155R61C104KA88D Series= X5R	Cap= 100.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	 0402 3 mm²
12.	Csc	MuRata	GRM033R60J103KA01D Series= X5R	Cap= 10.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	 0201 2 mm²
13.	Csnub	TDK	C3225X7T2J154K Series= X7T	Cap= 150.0 nF ESR= 11.907 mOhm VDC= 630.0 V IRMS= 0.0 A	1	$0.19	 1210 15 mm²
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 mm²
15.	Cvcc	MuRata	GRM188R71E104KA01D Series= X7R	Cap= 100.0 nF ESR= 30.0 mOhm VDC= 25.0 V IRMS= 1.51 A	1	$0.01	 0603 5 mm²
16.	Cx	TDK	B32913A5104M000 Series= 2231	Cap= 100.0 nF VDC= 1000.0 V IRMS= 0.0 A	1	$0.46	 B32913_2650x600x1500 228 mm²
17.	Cy1	CUSTOM	CUSTOM Series= ?	Cap= 2.04148 nF ESR= 1.0 mOhm VDC= 220.62 V IRMS= 500.0 uA	1	NA	CUSTOM 0 mm²
18.	Cy2	CUSTOM	CUSTOM Series= ?	Cap= 2.04148 nF ESR= 1.0 mOhm VDC= 220.62 V IRMS= 500.0 uA	1	NA	CUSTOM 0 mm²
19.	Cy3	CUSTOM	CUSTOM Series= ?	Cap= 2.04148 nF ESR= 1.0 mOhm VDC= 220.62 V IRMS= 500.0 uA	1	NA	CUSTOM 0 mm²
20.	D21	Vishay-Semiconductor	SS12-E3/61T	VF@Io= 500.0 mV VRRM= 20.0 V	1	$0.08	 SMA 37 mm²
21.	Dac	Diodes Inc.	HD04-T	VF@Io= 1.0 V VRRM= 400.0 V	1	$0.12	 MiniDIP 62 mm²
22.	Daux	Fairchild Semiconductor	FSV10120V	VF@Io= 800.0 mV VRRM= 120.0 V	1	$0.21	 TO-277A 56 mm²
23.	Dsec	Fairchild Semiconductor	FSV8100V	VF@Io= 670.0 mV VRRM= 100.0 V	1	$0.21	 TO-277A 56 mm²
24.	Dsec2	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	$1.33	 DDPAK 210 mm²

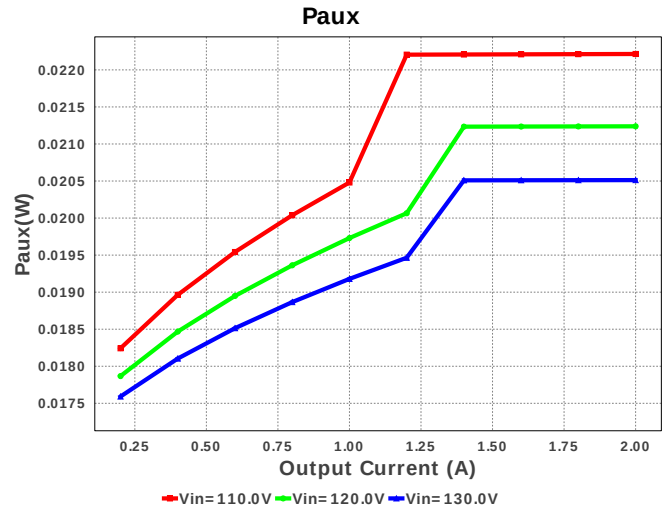
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
25.	Dsnub	Bourns	CD1408-FU1400	VF@Io= 1.05 V VRRM= 400.0 V	1	$0.13	 Diode_1408 13 mm^2
26.	L1	API Delevan	CM6296R-154	Lp= 150.0 µH Rp= 16.0 mOhm Leakage_L= 1.8 µH Ns1toNp= 1.0 Rs1= 0.0 Ohms	1	$5.95	 CM6296 833 mm^2
27.	L2	Coilcraft	SER1360-182KLB	L= 1.8 µH DCR= 2.4 mOhm	1	$0.72	 SER1360 225 mm^2
28.	M1	Fairchild Semiconductor	FDD6N50FTM	VdsMax= 500.0 V IdsMax= 5.5 Amps	1	$0.46	 DPAK 102 mm^2
29.	O1	Vishay-Semiconductor	TCMT1109	Optocoupler	1	$0.21	 SOP-4 44 mm^2
30.	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
31.	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
32.	R12	Vishay-Dale	CRCW0402374RFKED Series= CRCW..e3	Res= 374.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
33.	R13	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
34.	R21	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
35.	R22	Vishay-Dale	CRCW040225K5FKED Series= CRCW..e3	Res= 25.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
36.	Raux	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
37.	Rbias	Vishay-Dale	CRCW0402205RFKED Series= CRCW..e3	Res= 205.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
38.	Rcs	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
39.	Rdrv	Vishay-Dale	CRCW06035R11FKEA Series= CRCW..e3	Res= 5.11 Ohm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5 mm^2
40.	Rfbb	Yageo America	RT0805BRD071K42L Series= RT0805	Res= 1.42 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.05	 0805 7 mm^2
41.	Rfbt	Yageo America	RC0603FR-074K3L Series= ?	Res= 4.3 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5 mm^2

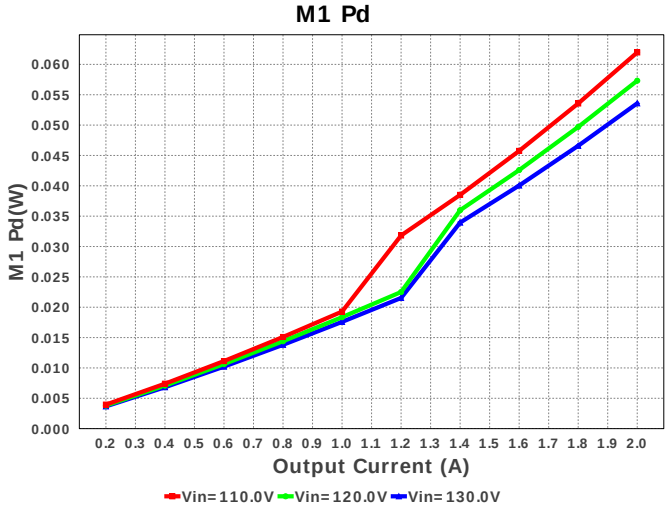
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
42.	Rled	Vishay-Dale	CRCW0402511RFKED Series= CRCW..e3	Res= 511.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
43.	Rsc	Vishay-Dale	CRCW04028K66FKED Series= CRCW..e3	Res= 8.66 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
44.	Rsns	Vishay-Dale	CRCW08051R96FKEA Series= CRCW..e3	Res= 1.96 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm^2
45.	Rsnub	Panasonic	ERJ-8ENF9762V Series= ERJ-8E	Res= 97.6 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	 1206 11 mm^2
46.	Rstartup1	Panasonic	ERJ-8ENF2672V Series= ERJ-8E	Res= 26.7 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	 1206 11 mm^2
47.	Rstartup2	Panasonic	ERJ-8ENF2672V Series= ERJ-8E	Res= 26.7 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	 1206 11 mm^2
48.	Rt	Vishay-Dale	CRCW04022K94FKED Series= CRCW..e3	Res= 2.94 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
49.	Rx1	Panasonic	ERJ-6ENF2003V Series= ERJ-6E	Res= 200.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm^2
50.	Rx2	Panasonic	ERJ-6ENF2003V Series= ERJ-6E	Res= 200.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm^2
51.	T1	CUSTOM	CUSTOM	Lp= 592.789 µH Rp= 870.0 mOhm Leakage_L= 11.856 µH Ns1toNp= 0.076 Rs1= 8.6 mOhms Ns2toNp= 0.166 Rs2= 700.0 µOhms	1	NA	CUSTOM 0 mm^2
52.	U1	Texas Instruments	UC3845N	Switcher	1	$0.56	 P0008A 116 mm^2
53.	VR	Texas Instruments	LMV431CM5/NOPB	Voltage References	1	$0.16	 R-PDSO-G3 16 mm^2

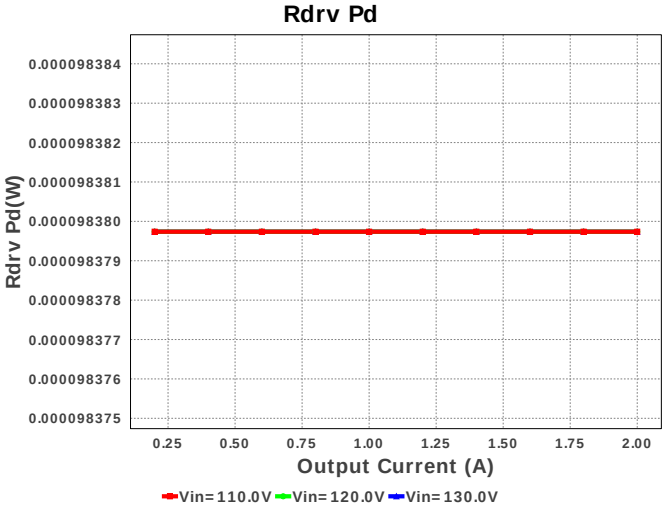


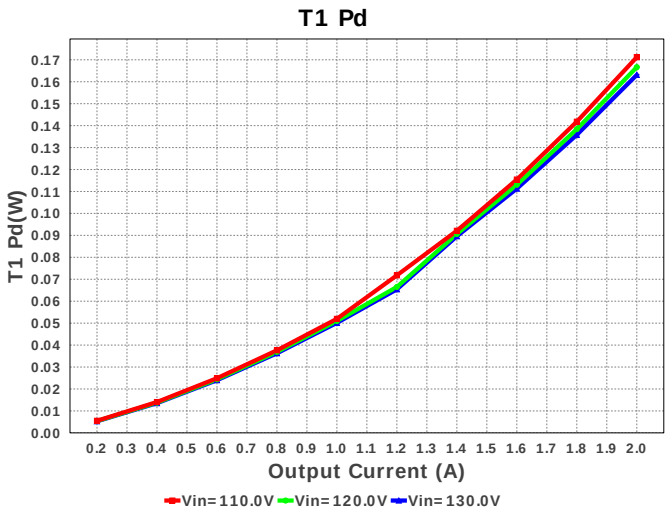


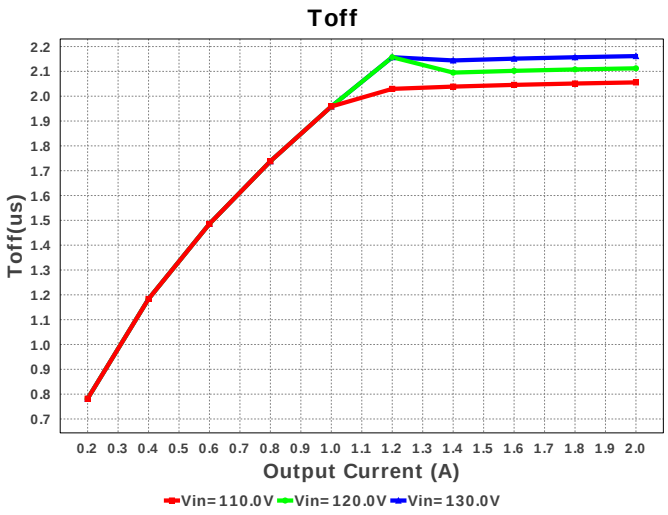


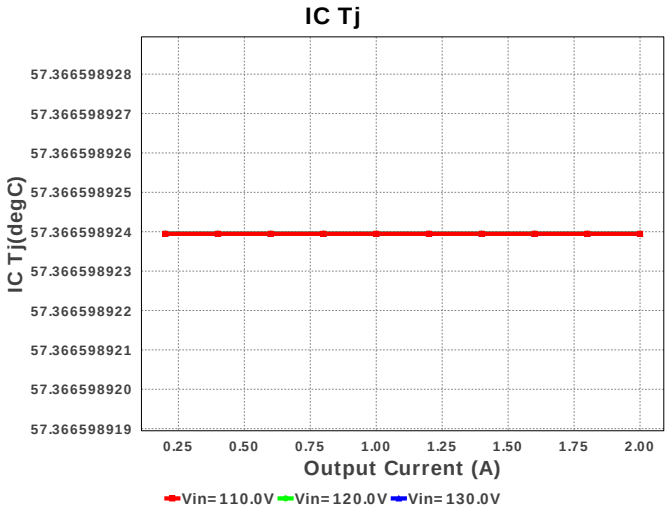


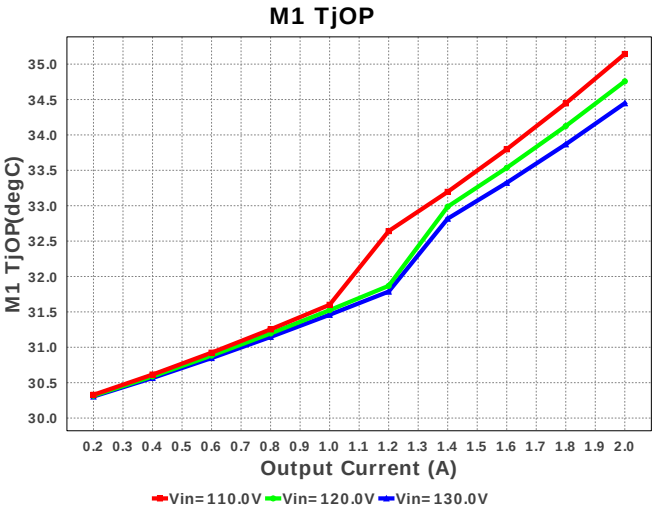


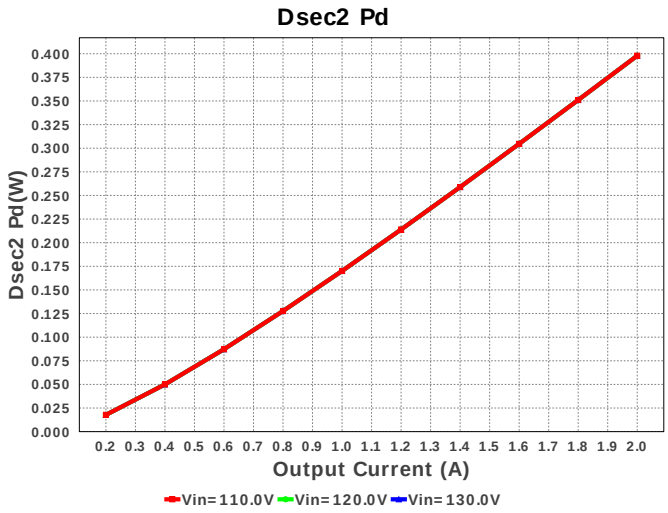


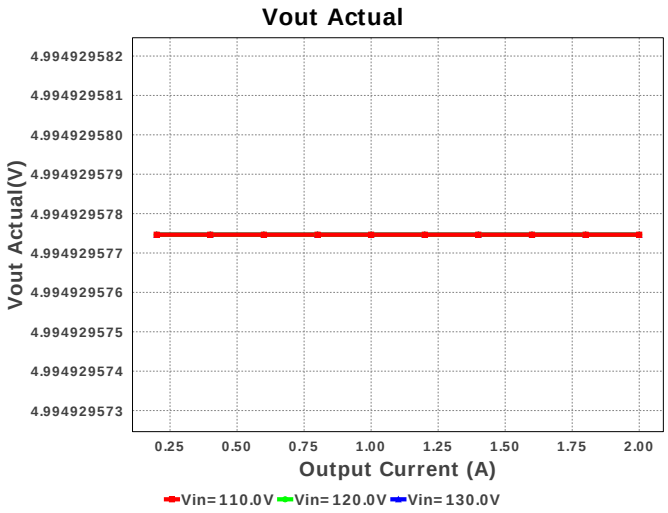




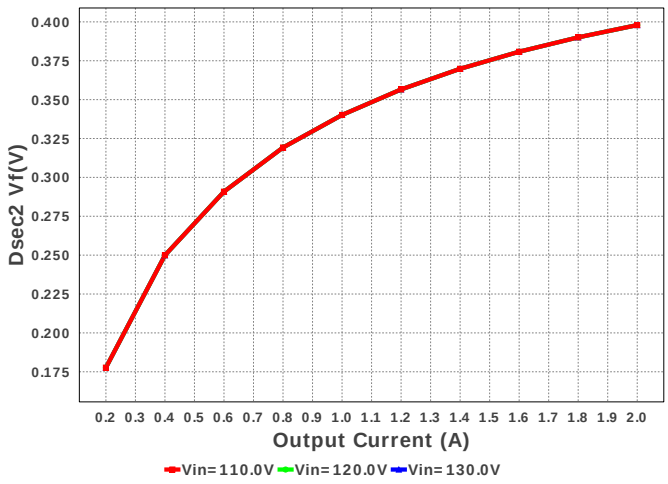




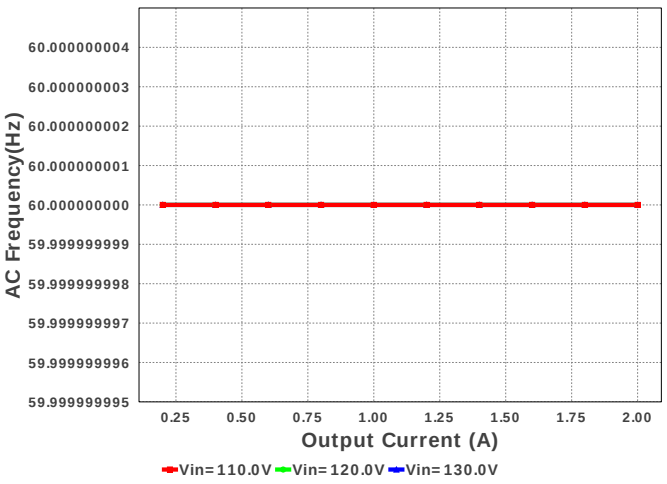




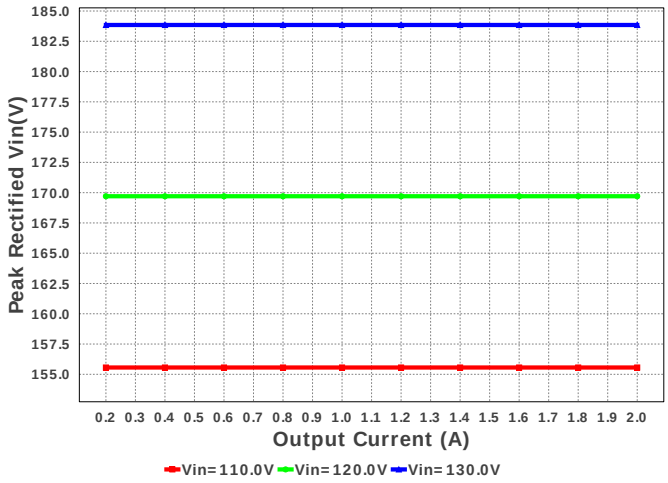
Dsec2 Vf



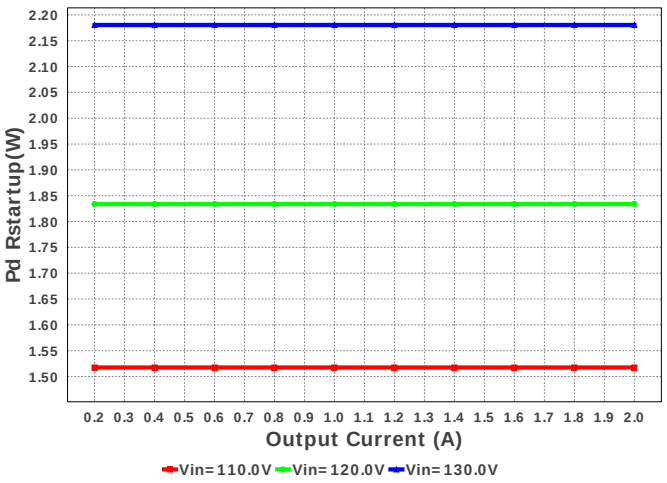
AC Frequency



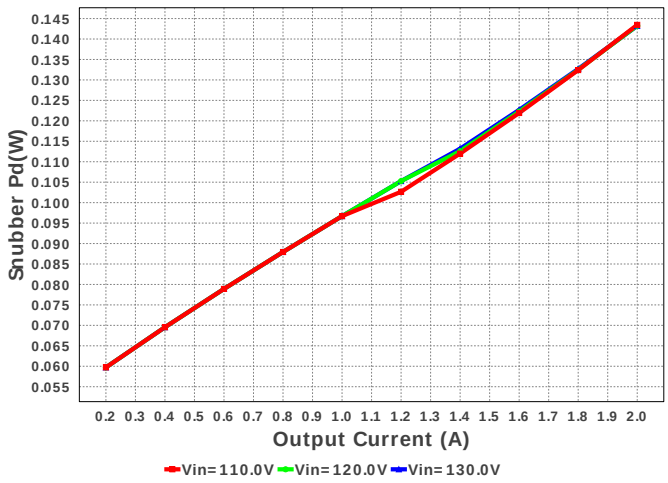
Peak Rectified Vin



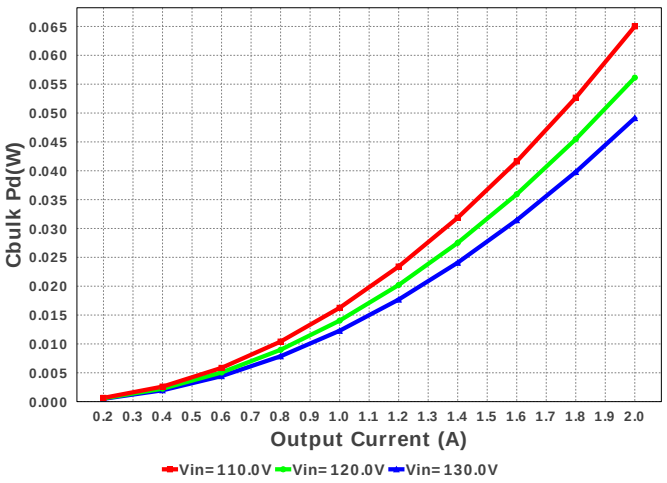
Pd Rstartup

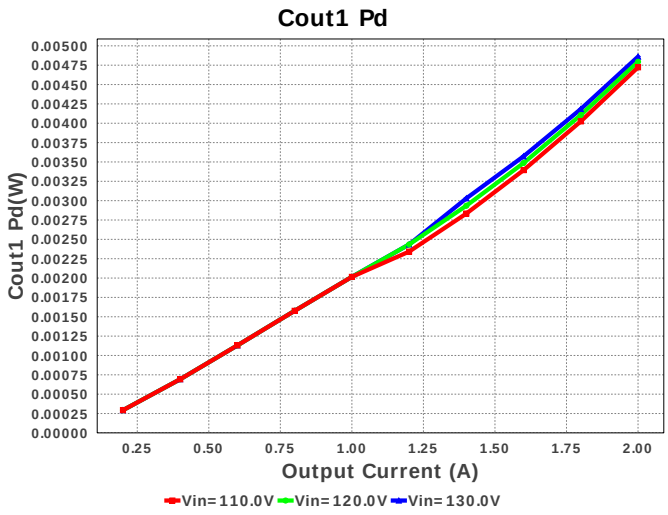


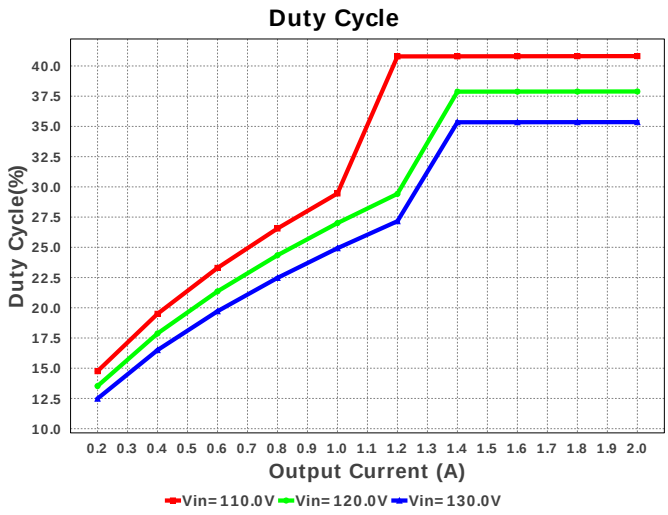
Snubber Pd

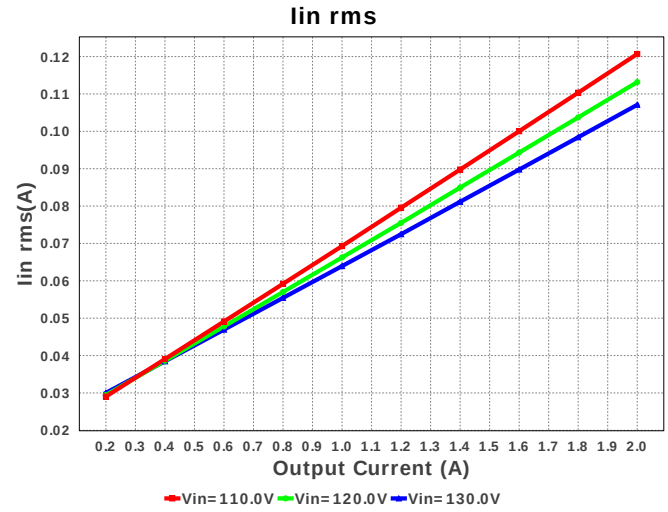


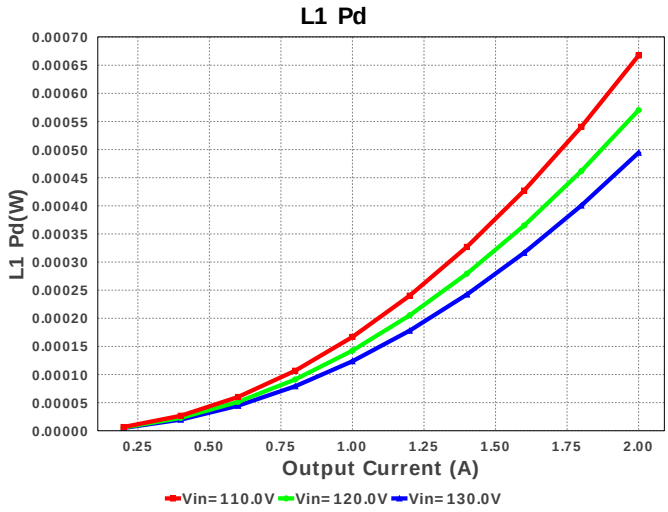
Cbulk Pd

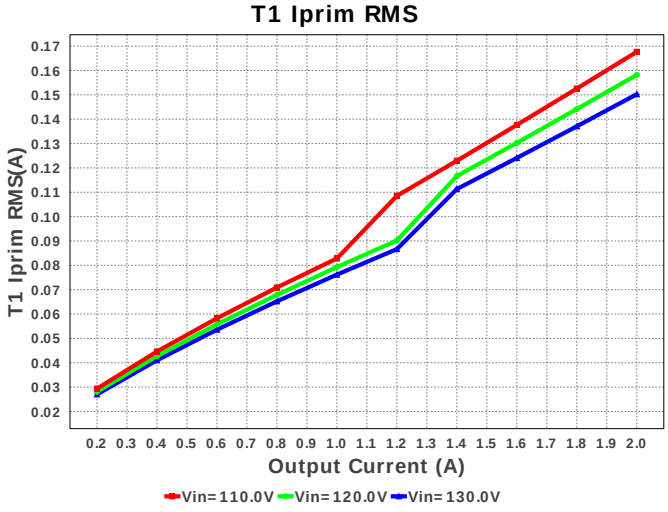


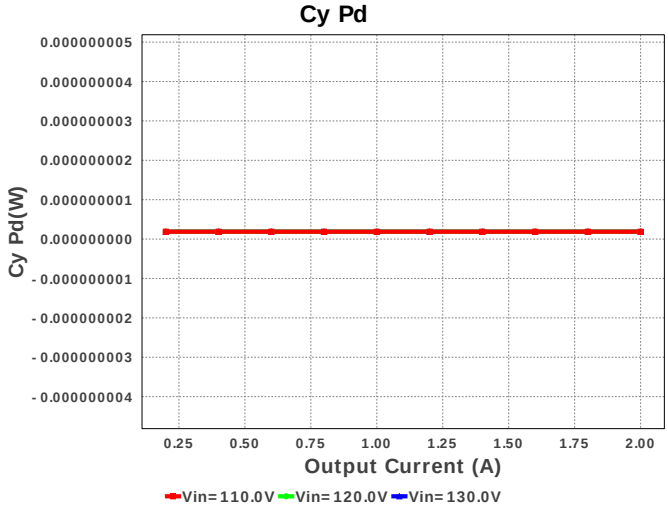


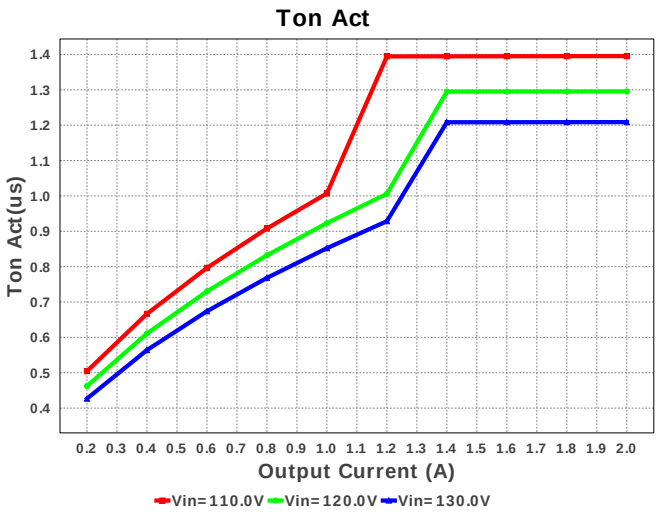


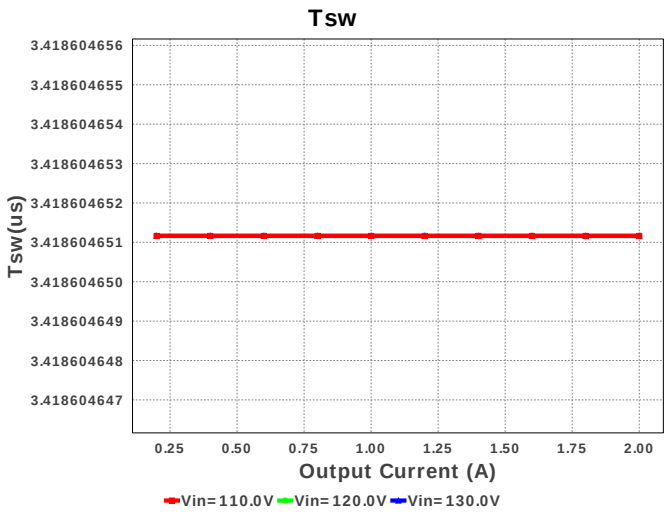


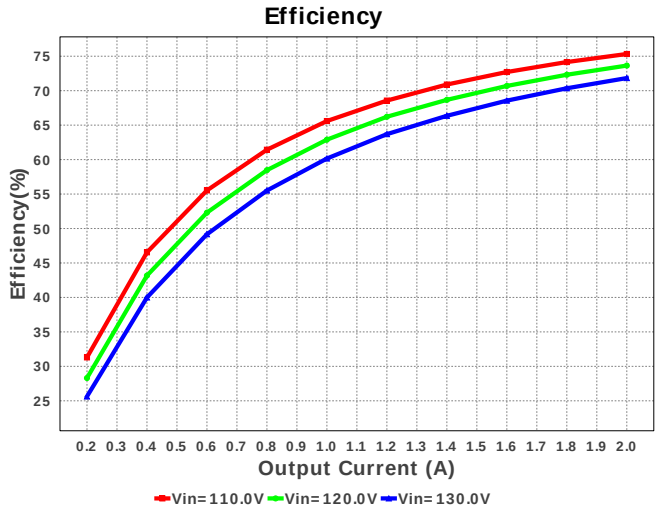


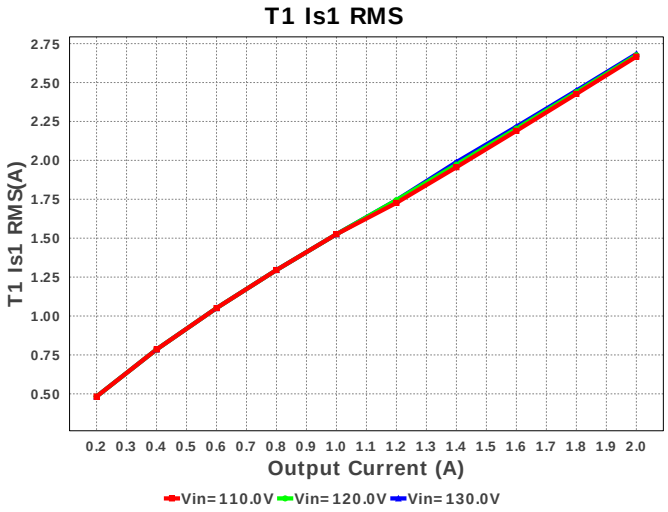


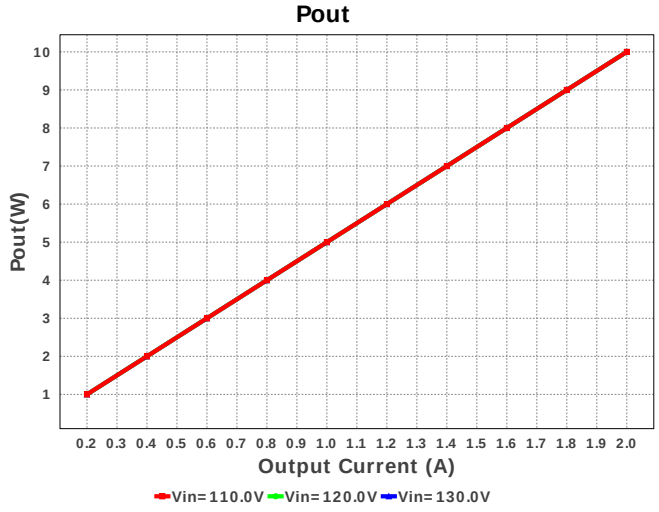


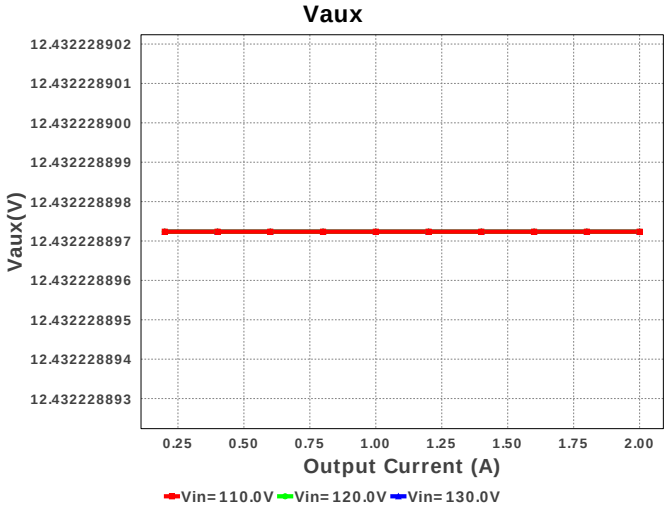


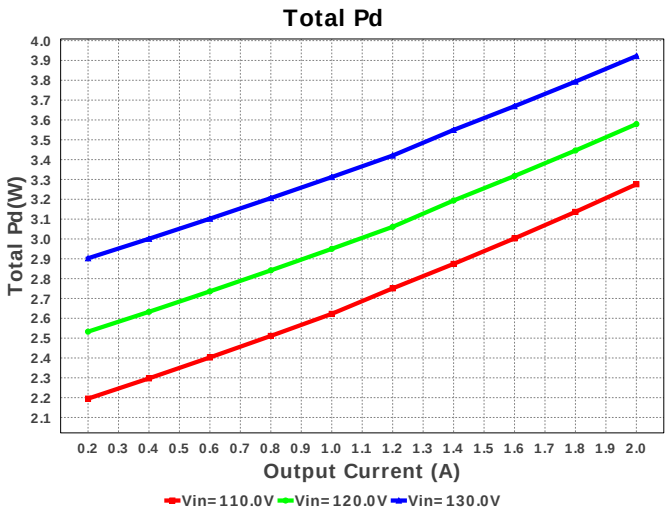


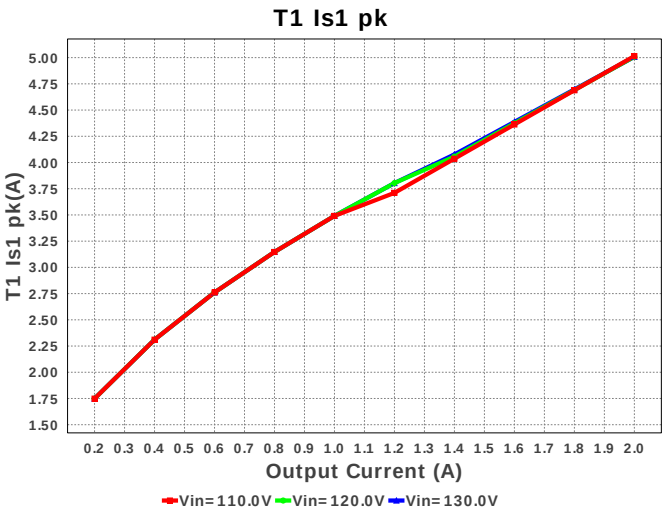


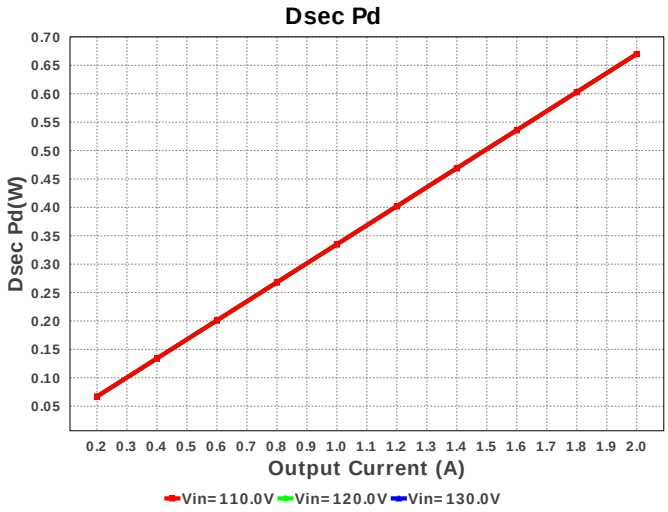


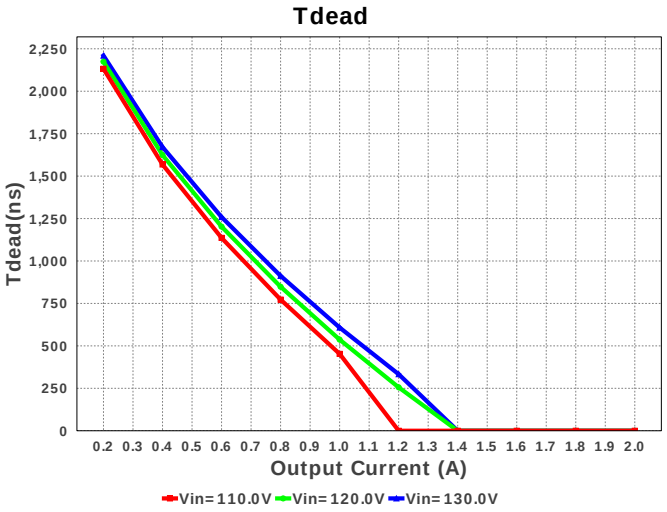


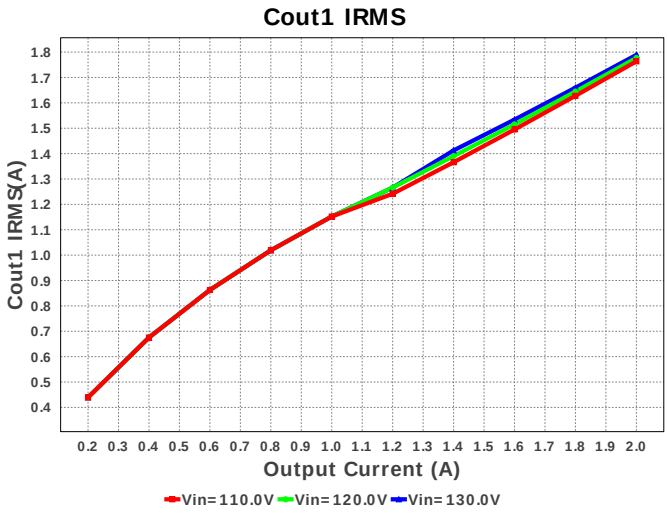


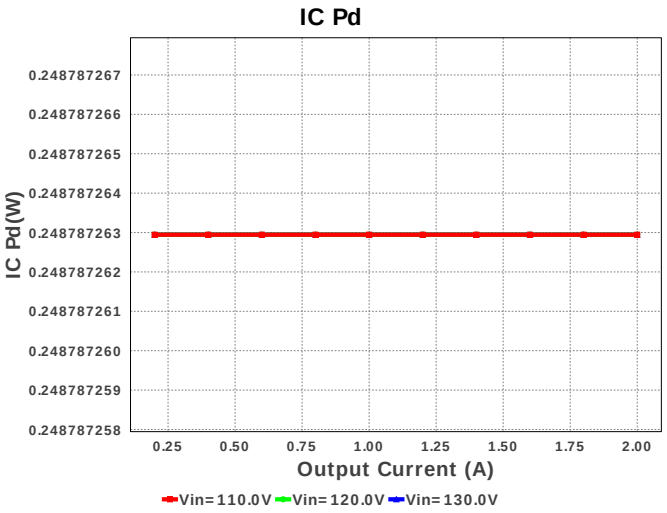


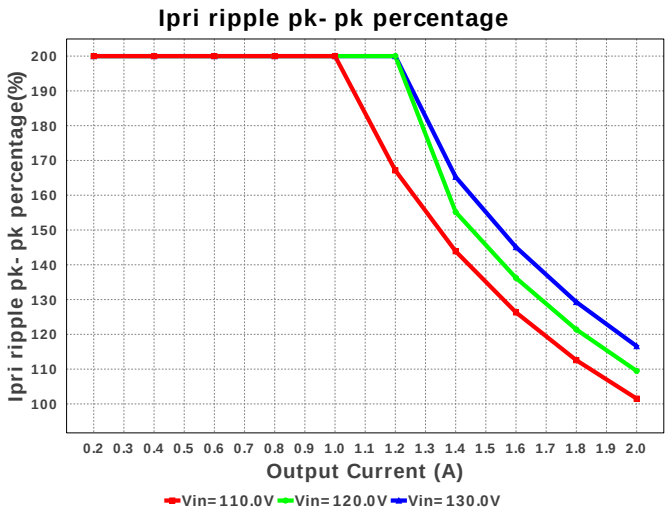


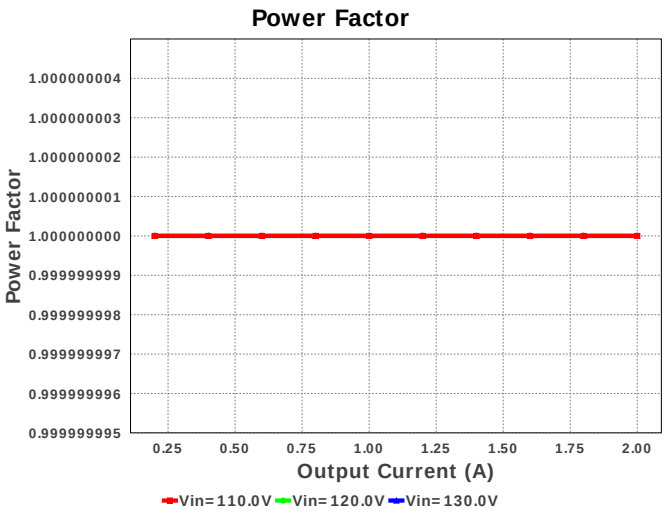


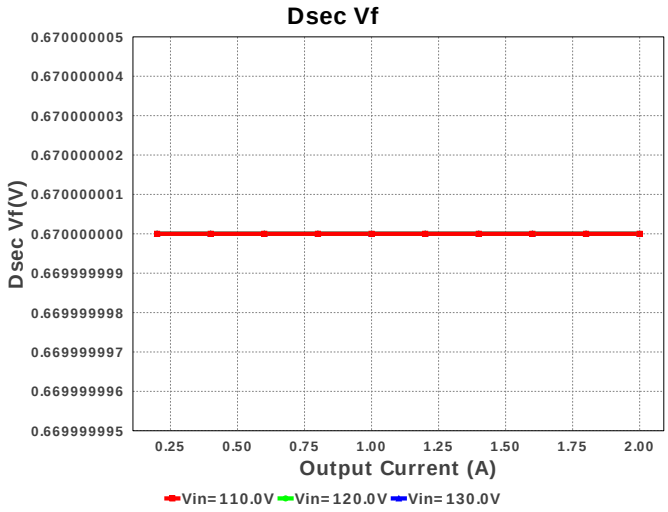


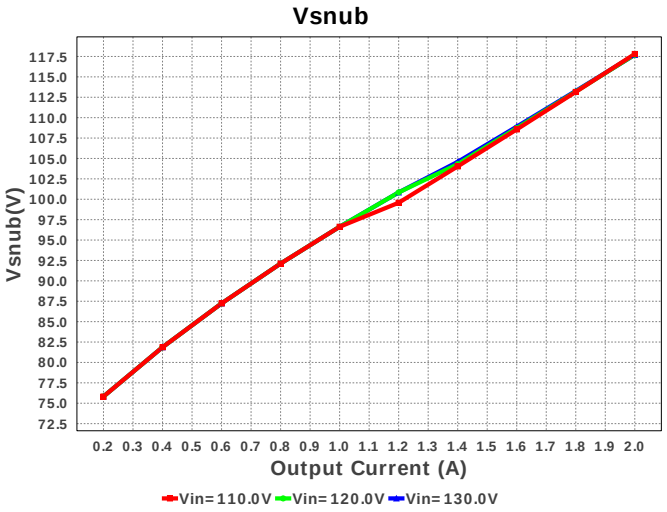


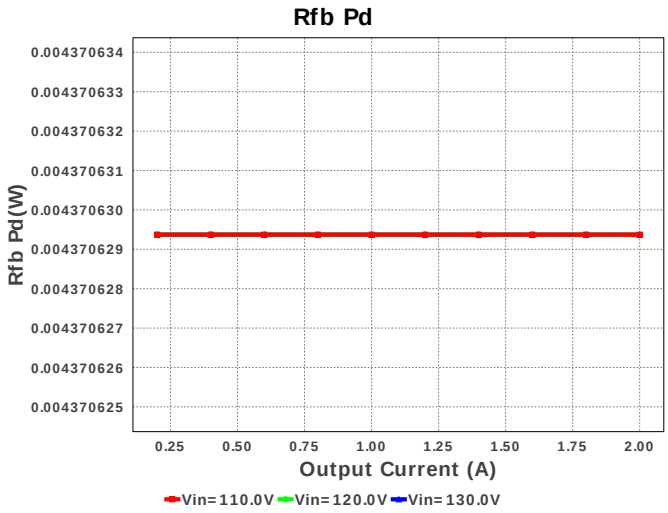


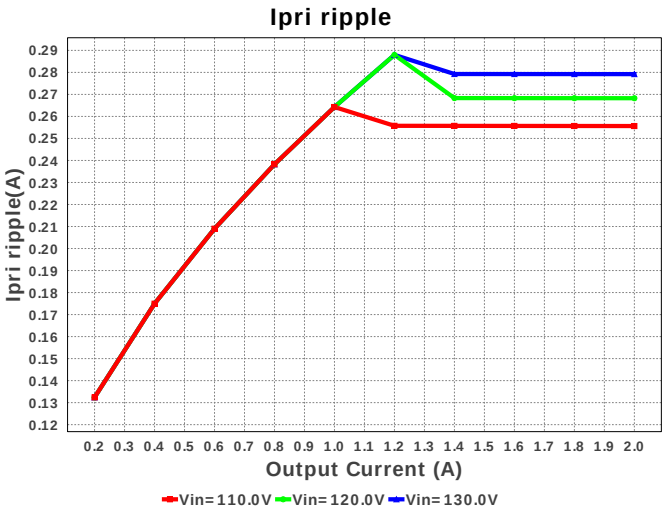


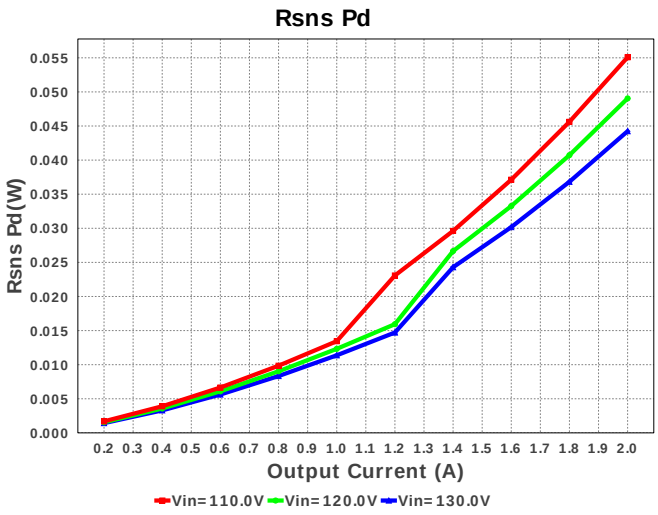


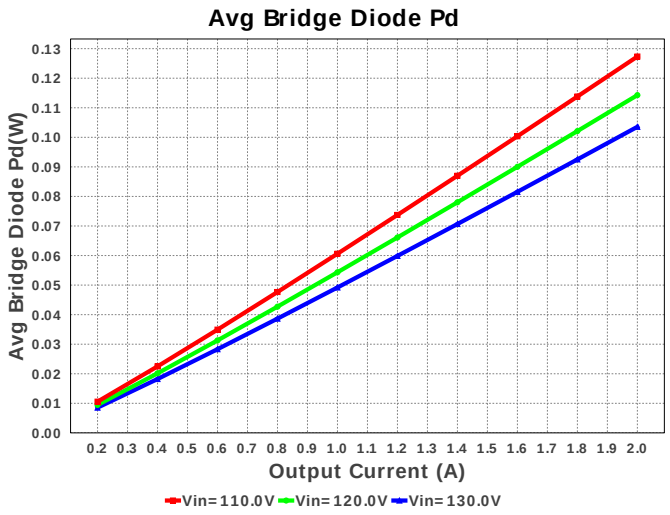


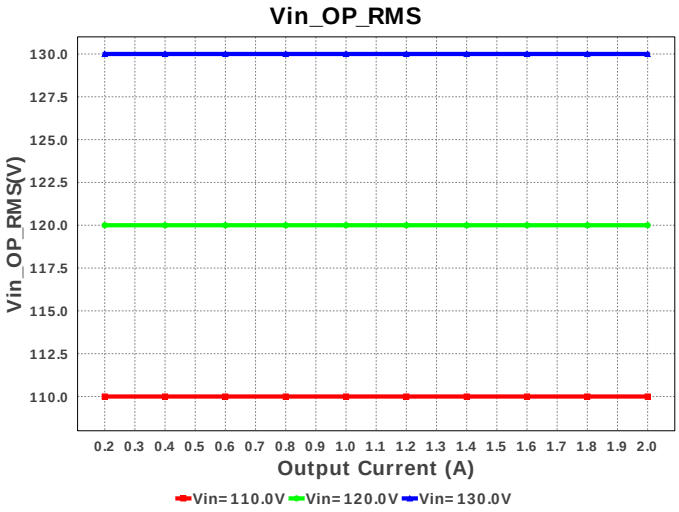


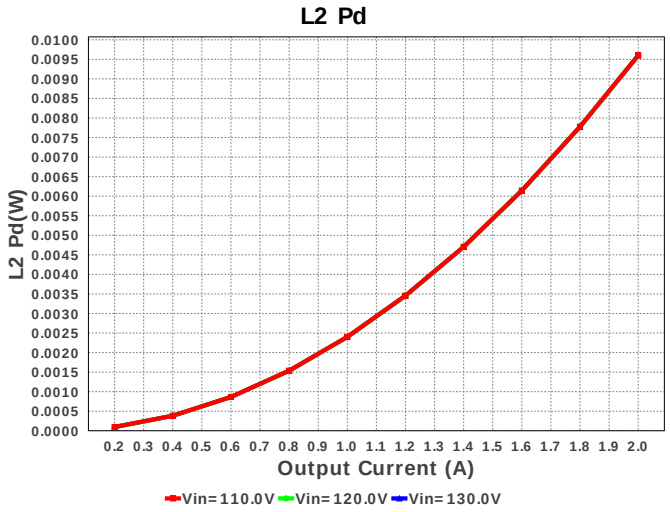


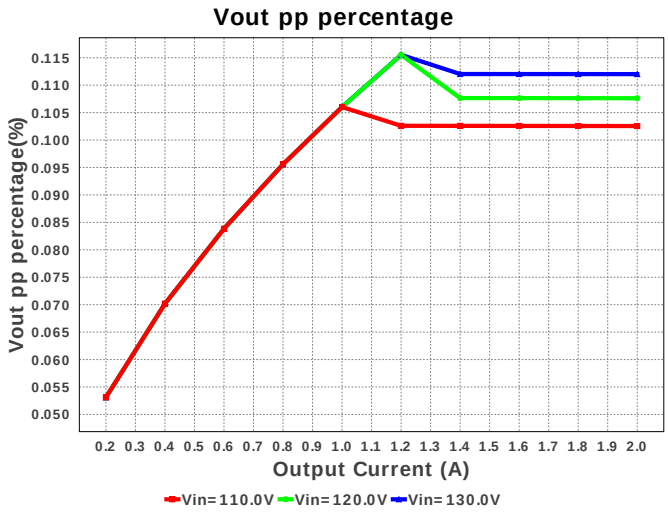


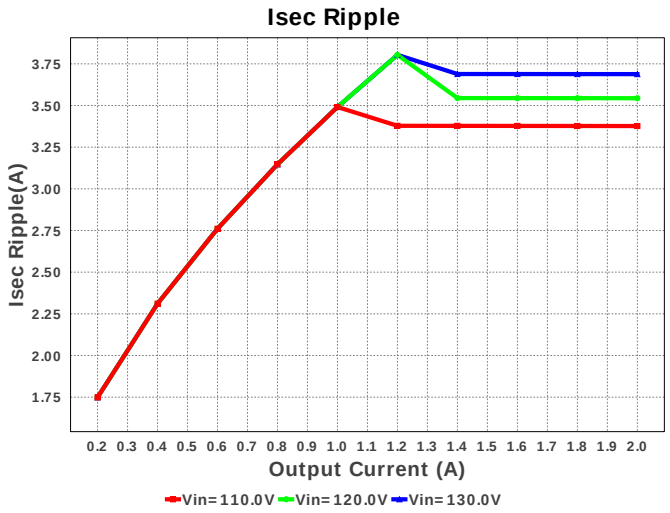


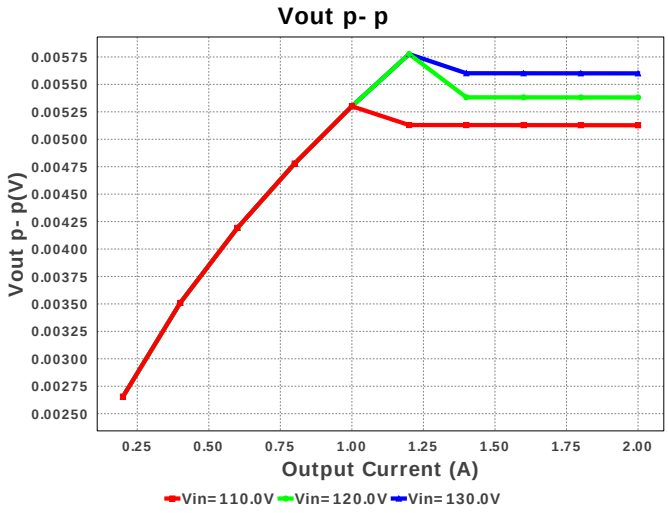


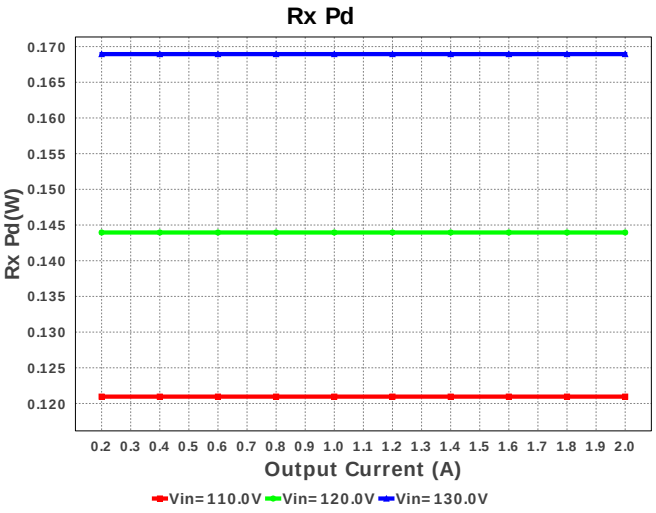


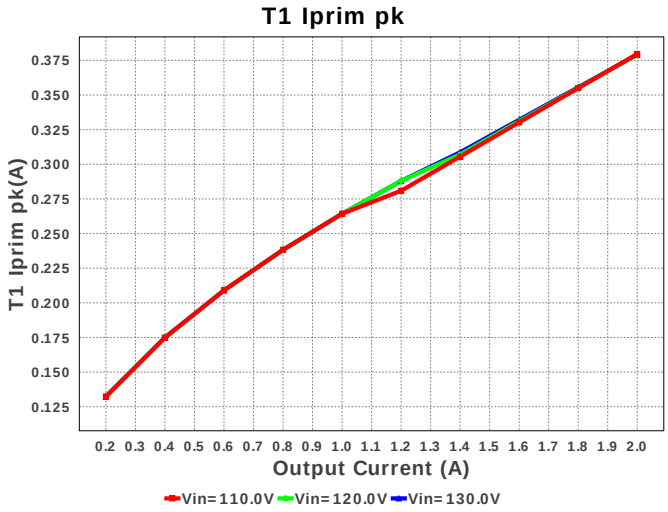












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	1.764 A	Current	Output capacitor1 RMS ripple current
2.	Iin rms	120.69 mA	Current	RMS Input Current
3.	Iout_DCM	1.139 A	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	102.776 mA	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	255.633 mA	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	101.52 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	3.377 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	167.637 mA	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	379.621 mA	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	2.666 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	5.015 A	Current	Transformer Secondary1 Peak Current
12.	AC Frequency	50.0 Hz	General	Input AC frequency
13.	BOM Count	57	General	Total Design BOM count
14.	Daux trr	16.7 ns	General	Auxiliary Diode Reverse Recovery Time
15.	Dsec Vf	670.0 mV	General	Effective Forward Voltage Drop at the Operating Current
16.	Dsec trr	19.64 ns	General	Output Diode Reverse Recovery Time
17.	Dsec2 Vf	397.923 mV	General	Effective Forward Voltage Drop at the Operating Current
18.	Dsnub trr	35.0 ns	General	Snubber Diode Reverse Recovery Time
19.	FootPrint	2.627 k mm^2	General	Total Foot Print Area of BOM components
20.	Frequency	292.517 kHz	General	Switching frequency
21.	Pout	10.0 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	2.056 us	General	Approximate Converter Off Time
25.	Ton Act	1.395 us	General	Approximate Converter On Time
26.	Total BOM	$0.0	General	Total BOM Cost
27.	Tsw	3.419 us	General	Switching Time Period
28.	Vaux	12.432 V	General	Auxiliary Voltage
29.	Vsnub	117.805 V	General	Voltage Across the Snubber

#	Name	Value	Category	Description
30.	Vout Actual	4.995 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
31.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
32.	Duty Cycle	40.816 %	Op_point	Duty cycle
33.	Efficiency	75.325 %	Op_point	Steady state efficiency
34.	IC Tj	57.367 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	35.143 degC	Op_point	M1 MOSFET junction temperature
38.	Peak Rectified Vin	155.562 V	Op_point	Peak voltage seen at rectified input
39.	Vin_OP_RMS	110.0 V	Op_point	AC Input RMS Voltage
40.	Vout p-p	5.128 mV	Op_point	Peak-to-peak output ripple voltage
41.	Avg Bridge Diode Pd	127.336 mW	Power	Average Power Dissipation in the Bridge Diode over the AC Line Period
42.	Cbulk Pd	65.017 mW	Power	Bulk capacitor power dissipation
43.	Cout1 Pd	4.723 mW	Power	Output capacitor1 power dissipation
44.	Cx Pd	0.0 W	Power	X-cap Power Dissipation
45.	Cy Pd	187.5 pW	Power	Y-caps Power Dissipation
46.	Dsec Pd	670.0 mW	Power	Secondary Diode Power Dissipation
47.	Dsec2 Pd	397.923 mW	Power	Secondary Diode Power Dissipation
48.	IC Pd	248.787 mW	Power	IC power dissipation
49.	L1 Pd	667.353 µW	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	61.968 mW	Power	M1 MOSFET total power dissipation
52.	Paux	22.215 mW	Power	Power Dissipation in Raux and Daux
53.	Pd Rstartup	1.517 W	Power	Power Dissipation in Rstartup1 and Rstartup2
54.	Rdrv Pd	98.38 µW	Power	Power Dissipation in Gate Drive Resistor
55.	Rfb Pd	4.371 mW	Power	Rfb Power Dissipation
56.	Rsns Pd	55.08 mW	Power	Current Limit Sense Resistor Power Dissipation
57.	Rx Pd	120.961 mW	Power	Total Power Dissipation in Rx1 and Rx2
58.	Snubber Pd	143.459 mW	Power	Snubber Power Dissipation
59.	T1 Pd	171.192 mW	Power	Estimated Losses in Transformer
60.	Total Pd	3.276 W	Power	Total Power Dissipation
61.	Vout Tolerance	1.478 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
62.	Vout pp percentage	102.551 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	130.0	Maximum input voltage
3.	VinMin	110.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	acFrequency	50.0	Light Output in Lumen
6.	base_pn	UC3845	Texas Instruments Base Part Number
7.	source	AC	Input Source Type
8.	ta	30.0	Ambient temperature

Design Assistance

1. UC3845 Product Folder : http://www.ti.com/product/UC3845 : contains the data sheet and other resources.