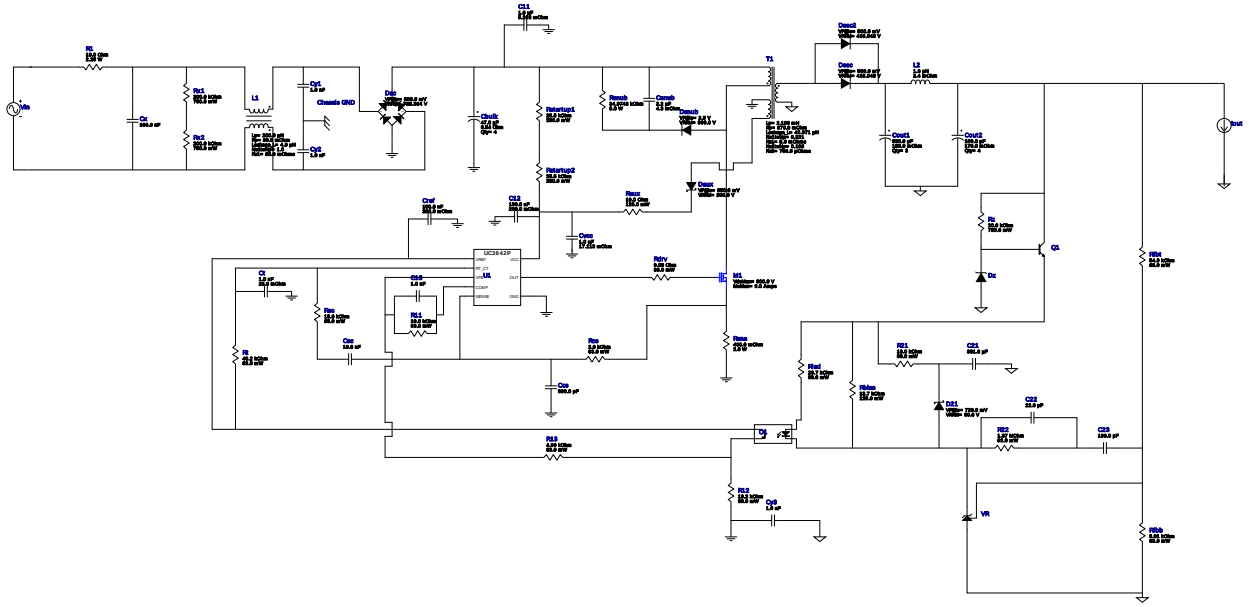
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 110.0V
VinMax = 260.0V
Vout = 48.0V
Iout = 2.0A

Device = UC3842N
Topology = Flyback
Created = 8/3/16 11:32:46 PM
BOM Cost = $0.00
BOM Count = 64
Total Pd = 12.31W

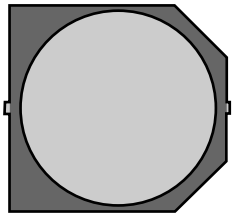
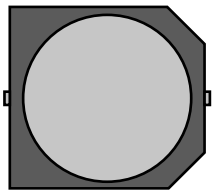
Design : 4178018/24 UC3842N
UC3842N 110.0V-260.0V to 48.00V @ 2.0A



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

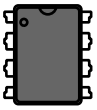
Electrical BOM

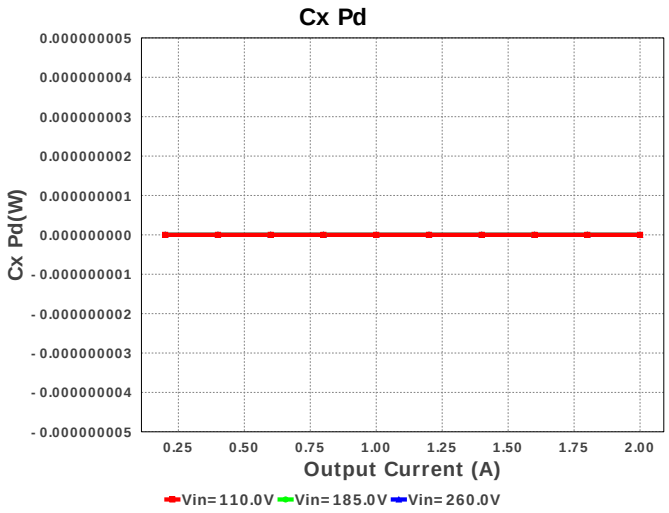
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C11	TDK	C5750X6S2W105K Series= X6S	Cap= 1.0 uF ESR= 5.263 mOhm VDC= 400.0 V IRMS= 0.0 A	1	$1.19	2220 54 mm^2
2.	C12	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
3.	C13	Samsung 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	CUSTOM	CUSTOM Series= ?	Cap= 381.6 uF VDC= 40.0 V IRMS= 0.0 A	1	NA	CUSTOM 0 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	Samsung Electro-Mechanics	CL21C161JBANNNC Series= C0G/NP0	Cap= 160.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
7.	Cbulk	Vishay-Bccomponents	MAL215759479E3 Series= 2239	Cap= 47.0 uF ESR= 3.54 Ohm VDC= 500.0 V IRMS= 680.0 mA	4	$2.68	157PUM-SI_2200x2500 576 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

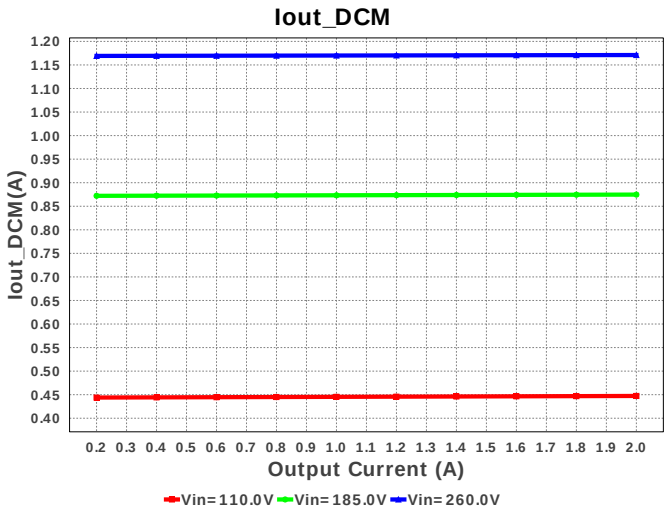
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cout1	Panasonic	EEV-FK2A331M Series= FK	Cap= 330.0 uF ESR= 153.0 mOhm VDC= 100.0 V IRMS= 917.0 mA	3	$0.92	 SM_RADIAL_K16 483 mm^2
10.	Cout2	Panasonic	EEV-FK2A151M Series= FK	Cap= 150.0 uF ESR= 170.0 mOhm VDC= 100.0 V IRMS= 793.0 mA	4	$0.78	 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	C5750X6S2W225K Series= X6S	Cap= 2.2 uF ESR= 4.3 mOhm VDC= 400.0 V IRMS= 0.0 A	1	NA	 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

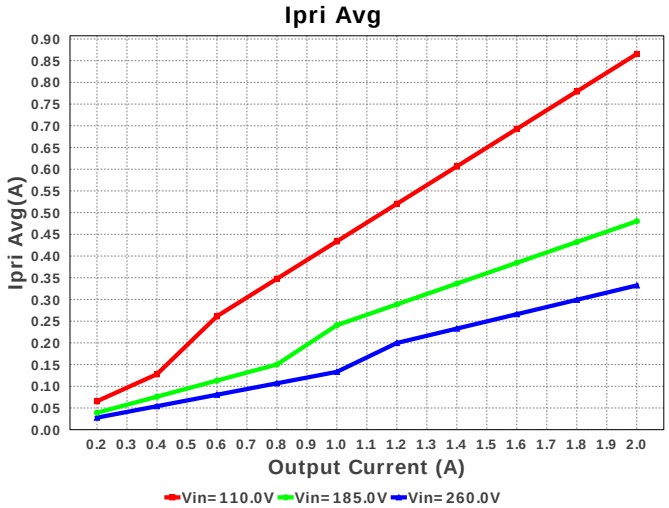
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
19.	Cy3	TDK	B81123C1102M Series= B81123	Cap= 1.0 nF VDC= 3.0 kV IRMS= 0.0 A	1	$0.22	 B81123_1800x500x1050 140 mm^2
20.	D21	ON Semiconductor	SS16T3G	VF@Io= 720.0 mV VRRM= 60.0 V	1	$0.08	 SMA 37 mm^2
21.	Dac	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 735.384 V	1	NA	CUSTOM 0 mm^2
22.	Daux	Diodes Inc.	DFLS1200-7	VF@Io= 850.0 mV VRRM= 200.0 V	1	$0.21	 PowerDI123 13 mm^2
23.	Dsec	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 415.048 V	1	NA	CUSTOM 0 mm^2
24.	Dsec2	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 415.048 V	1	NA	CUSTOM 0 mm^2
25.	Dsnub	Bourns	CD1408-FU1800	VF@Io= 2.5 V VRRM= 800.0 V	1	$0.13	 Diode_1408 13 mm^2
26.	Dz	Diodes Inc.	MMSZ5250B-7-F	Zener	1	$0.03	 SOD-123 13 mm^2
27.	L1	CUSTOM	CUSTOM	Lp= 200.0 µH Rp= 60.0 mOhm Leakage_L= 4.0 µH Ns1toNp= 1.0 Rs1= 60.0 mOhms	1	NA	CUSTOM 0 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
34.	R12	Vishay-Dale	CRCW040218K2FKED Series= CRCW..e3	Res= 18.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
35.	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
36.	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

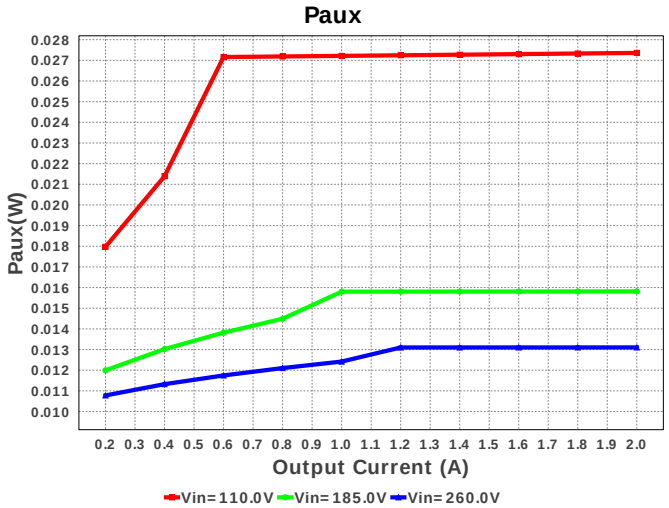
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
37.	R22	Vishay-Dale	CRCW04021M37FKED Series= CRCW..e3	Res= 1.37 MOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
38.	Raux	Vishay-Dale	CRCW080510R0FKEA Series= CRCW..e3	Res= 10.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
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	CRCW04029R09FKED Series= CRCW..e3	Res= 9.09 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	CRCW040226K7FKED Series= CRCW..e3	Res= 26.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
45.	Rsc	Vishay-Dale	CRCW040215K8FKED Series= CRCW..e3	Res= 15.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
46.	Rsns	Stackpole Electronics Inc	CSRN2512FKR400 Series= ?	Res= 400.0 mOhm Power= 2.0 W Tolerance= 1.0%	1	$0.13	2512 43 mm²
47.	Rsnub	CUSTOM	CUSTOM Series= ?	Res= 34.9743 kOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
48.	Rstartup1	Panasonic	ERJ-8ENF2552V Series= ERJ-8E	Res= 25.5 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	1206 11 mm²
49.	Rstartup2	Panasonic	ERJ-8ENF2552V Series= ERJ-8E	Res= 25.5 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	1206 11 mm²
50.	Rt	Vishay-Dale	CRCW040240K2FKED Series= CRCW..e3	Res= 40.2 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	CRCW201020K0FKEF Series= CRCW..e3	Res= 20.0 kOhm Power= 750.0 mW Tolerance= 1.0%	1	$0.03	2010 32 mm²
54.	T1	CUSTOM	CUSTOM	Lp= 2.199 mH Rp= 870.0 mOhm Leakage_L= 43.971 µH Ns1toNp= 0.321 Rs1= 8.6 mOhms Ns2toNp= 0.106 Rs2= 700.0 µOhms	1	NA	CUSTOM 0 mm²

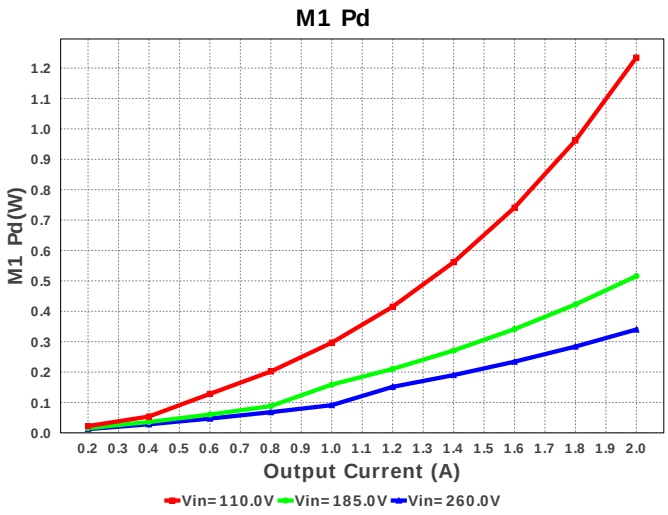
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
55.	U1	Texas Instruments	UC3842N	Switcher	1	$0.56	 P0008A 116 mm²
56.	VR	Texas Instruments	TL431AIDBZR	Voltage References	1	$0.08	 DBZ0003A 14 mm²

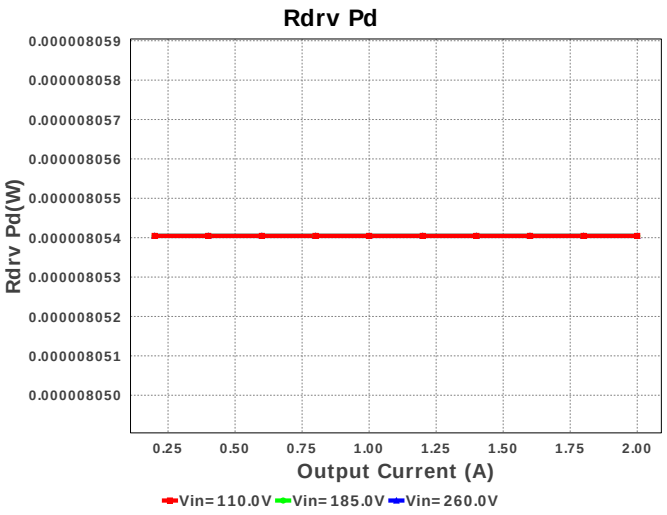


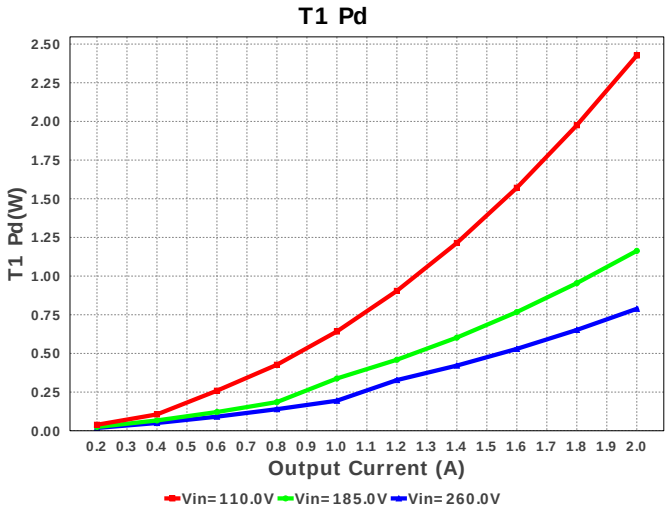


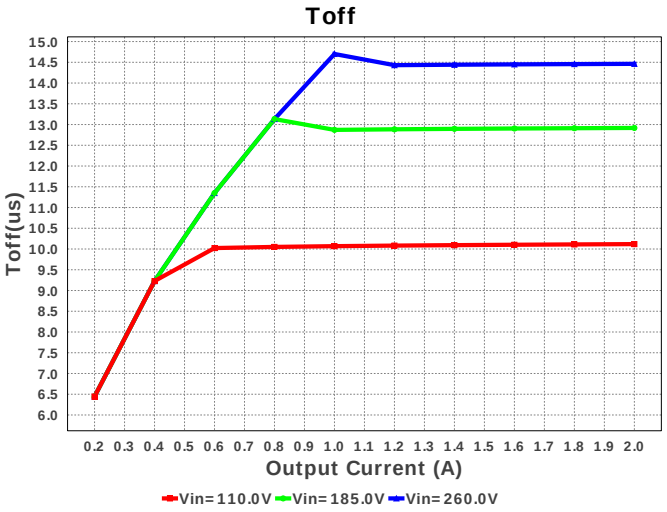


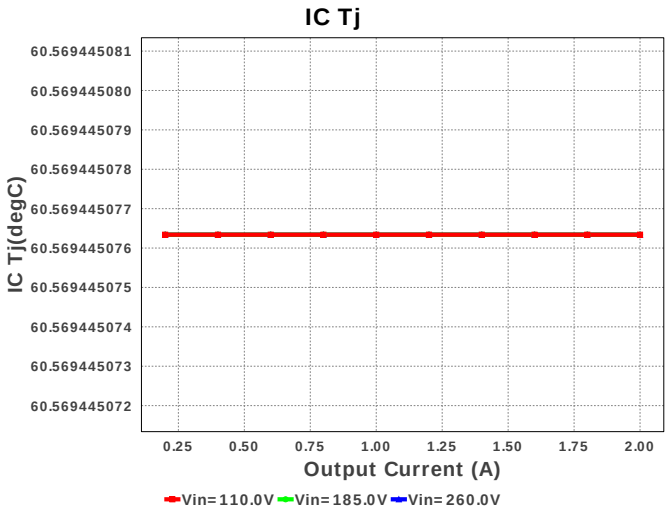


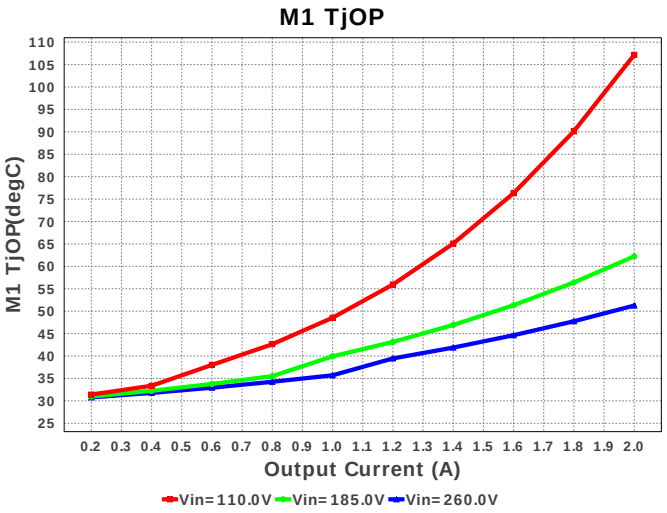


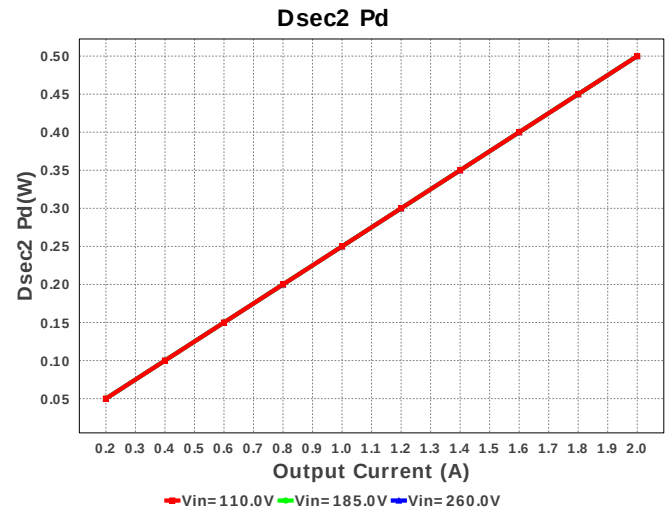


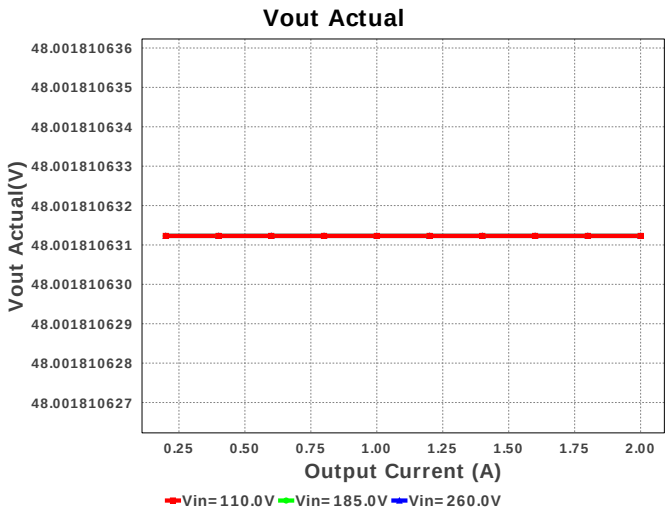


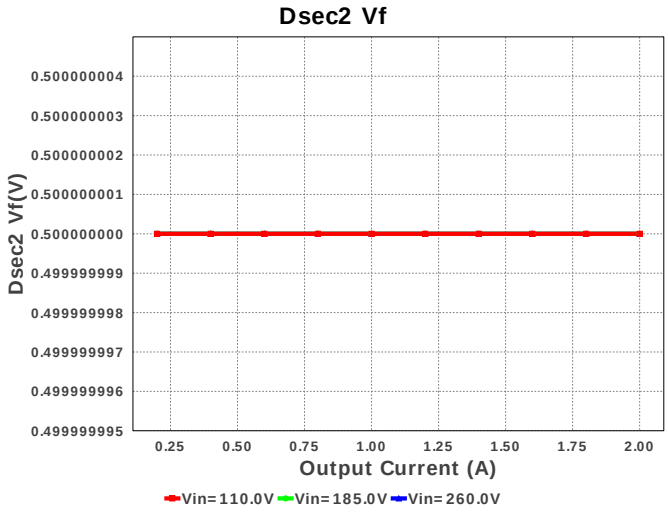


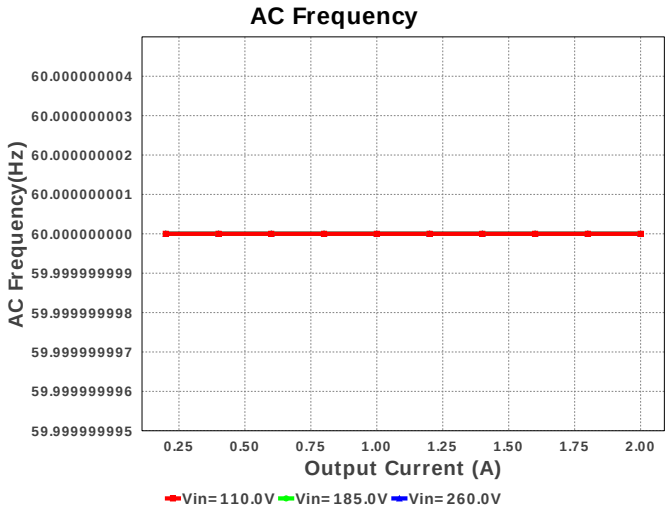


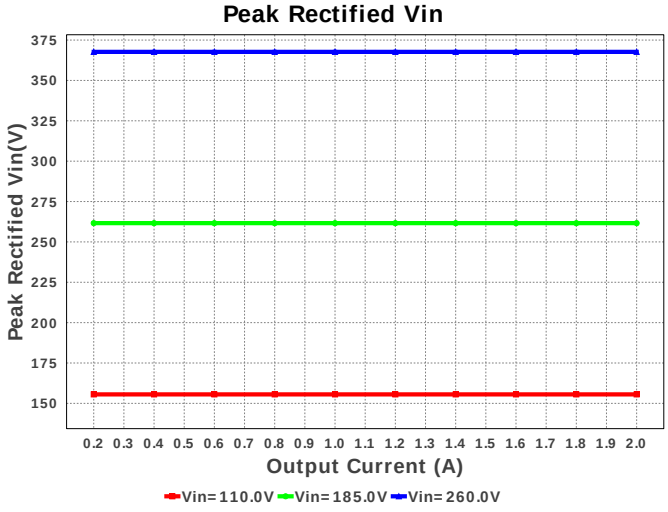


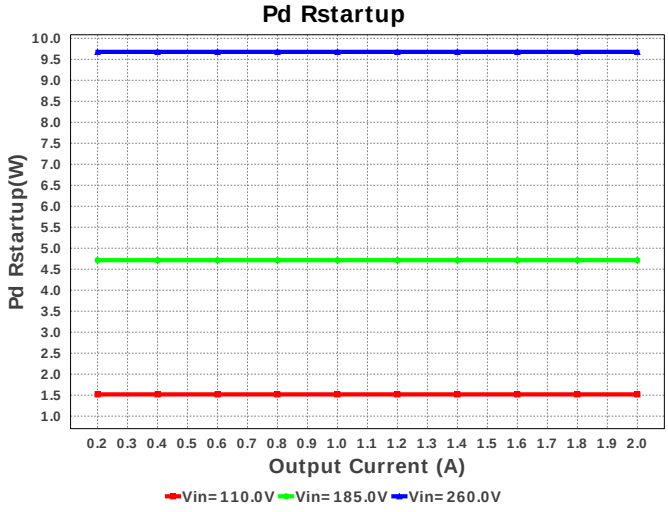


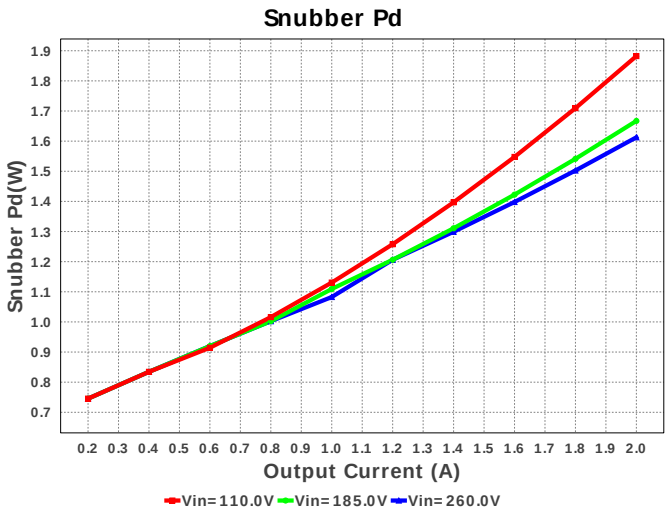


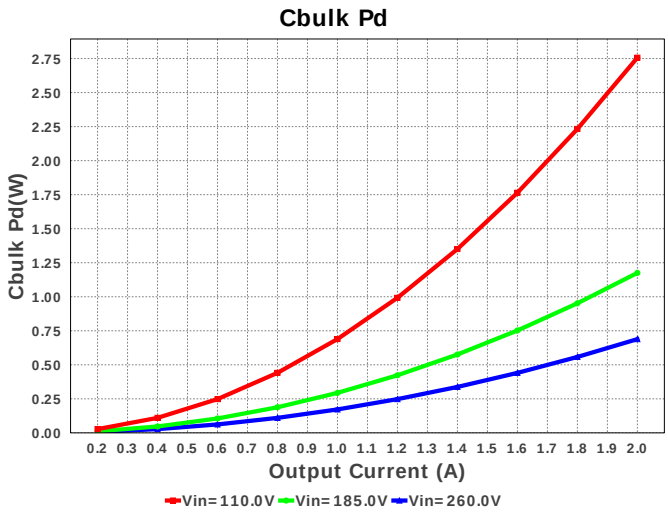


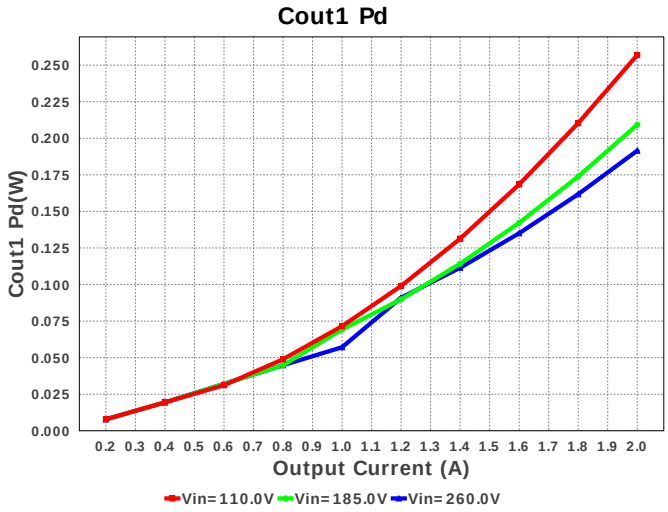


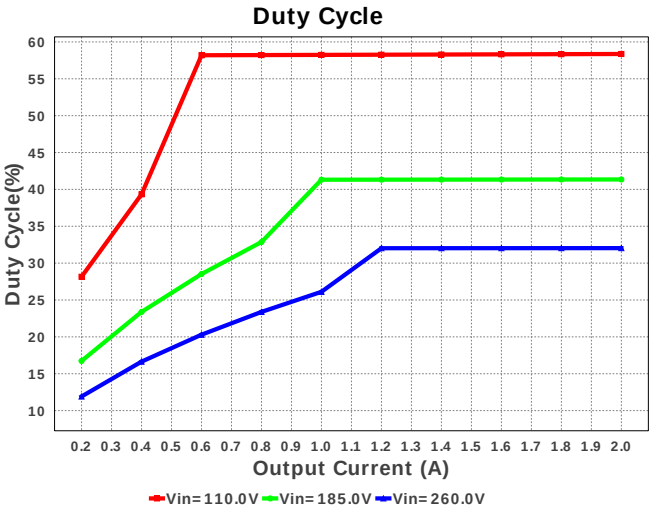


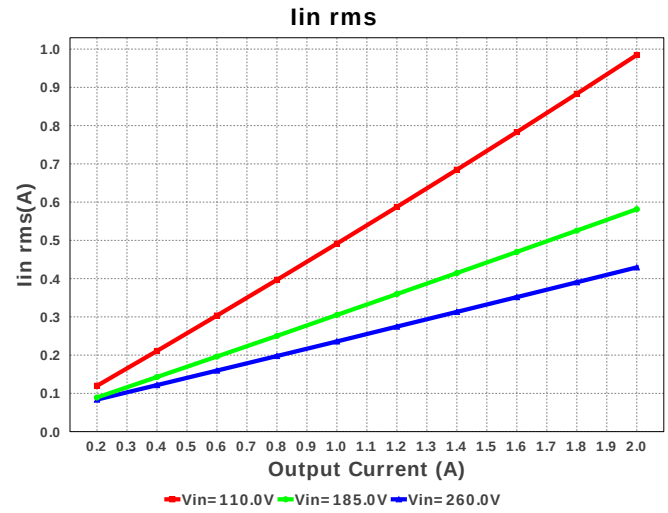


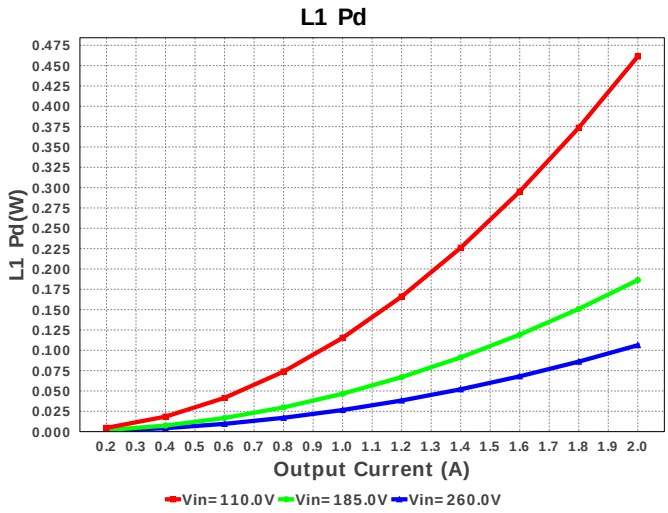


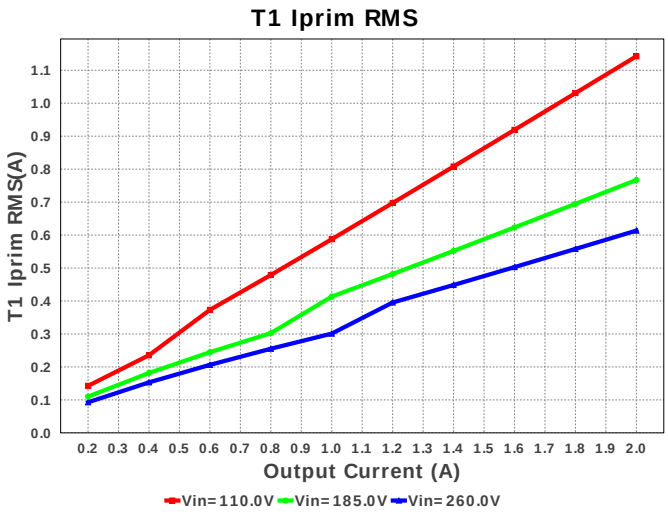


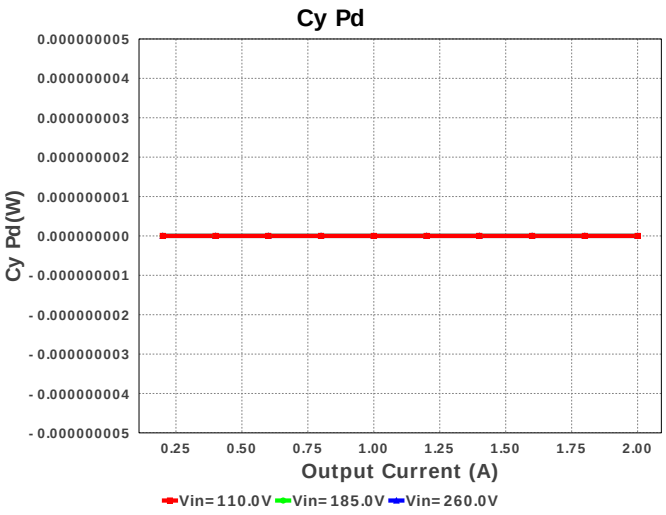


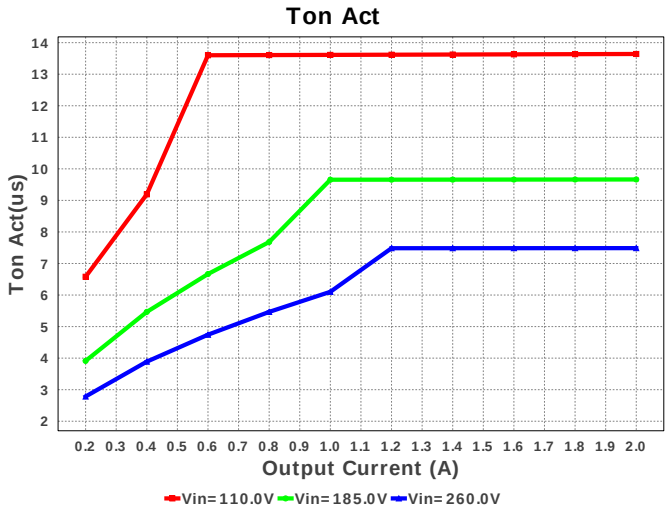


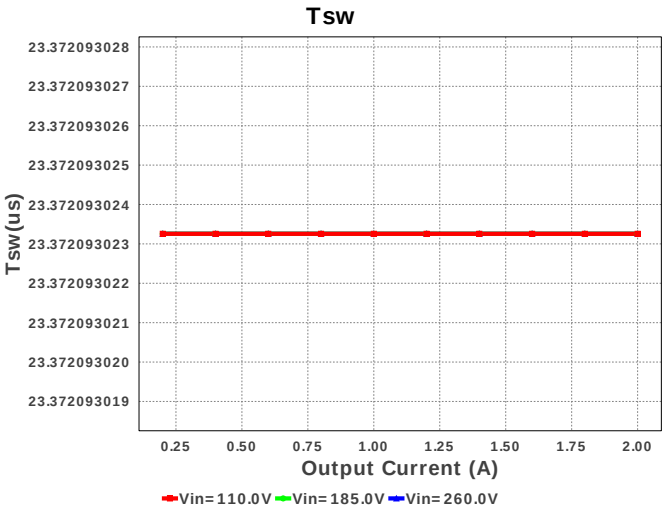


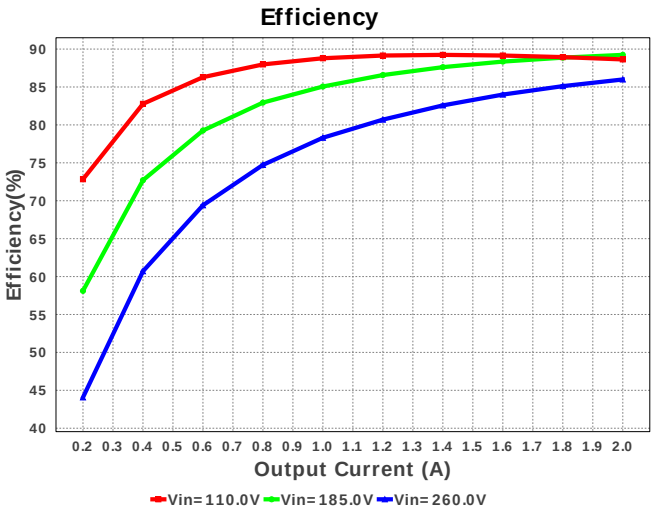


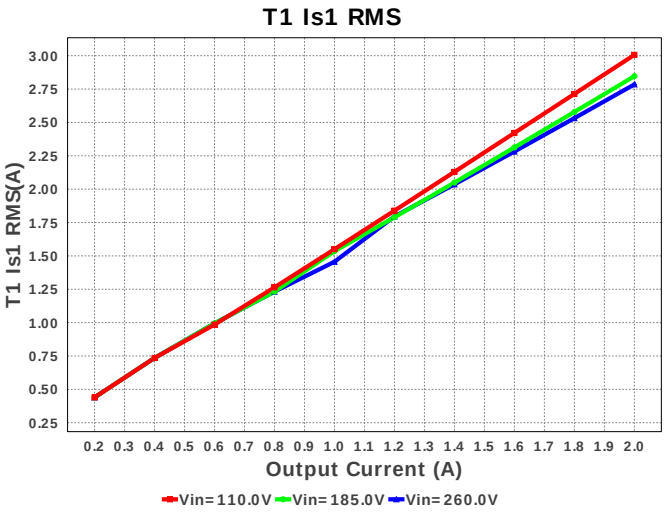


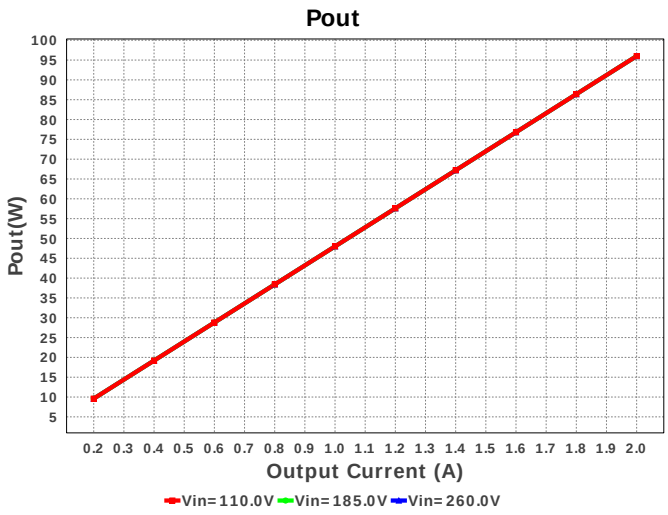


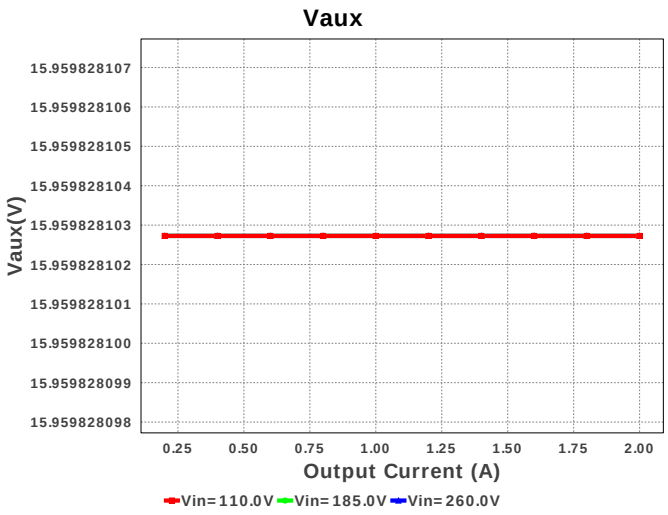


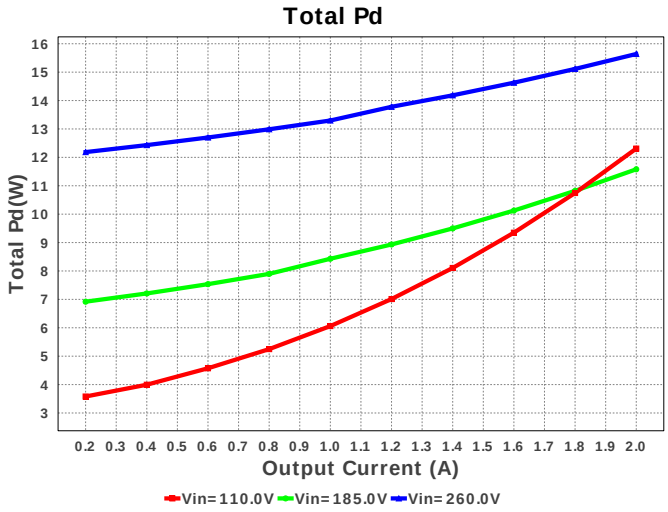


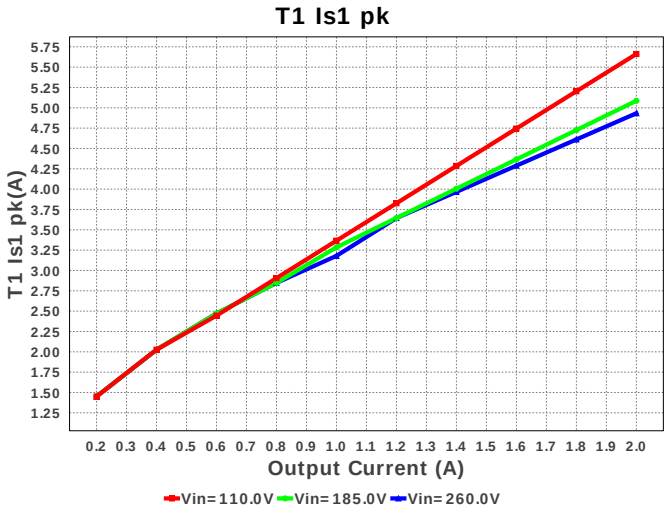


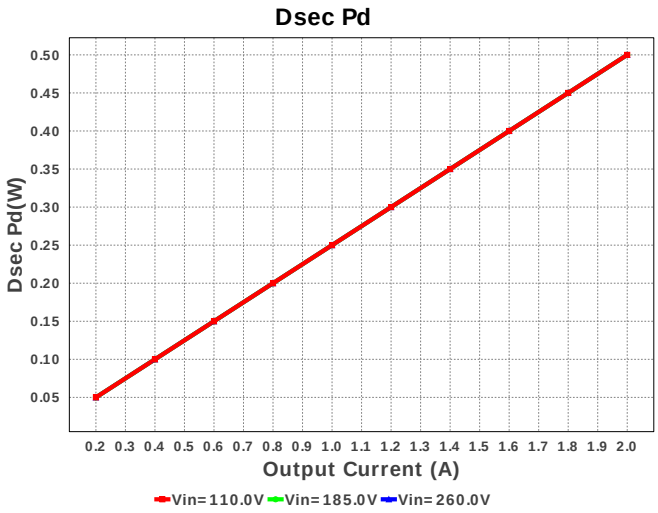


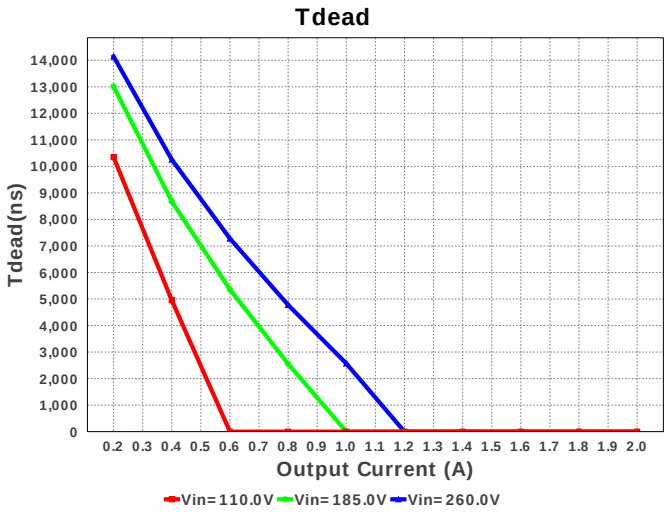


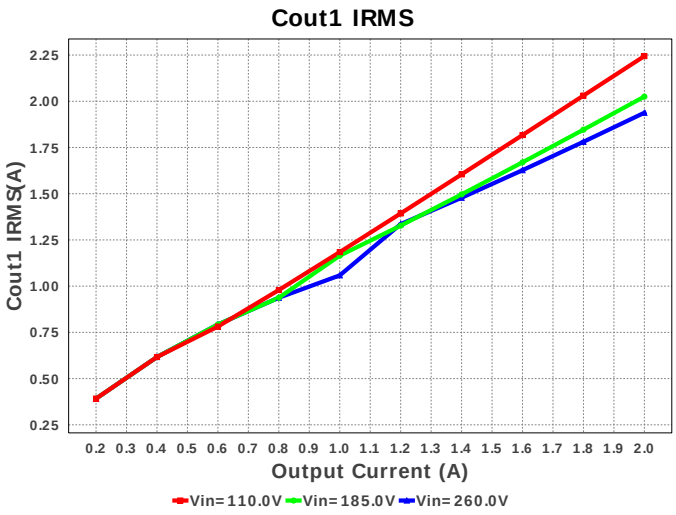


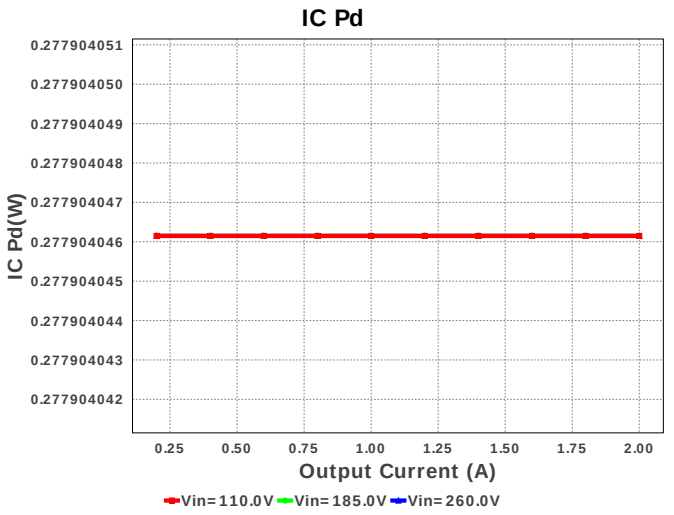


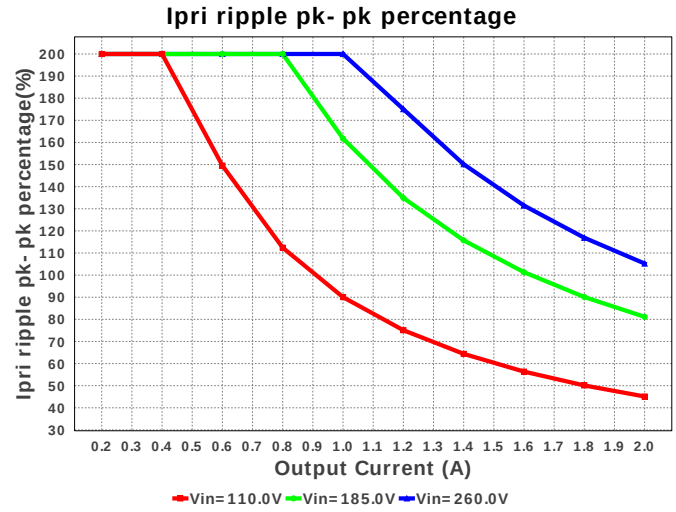


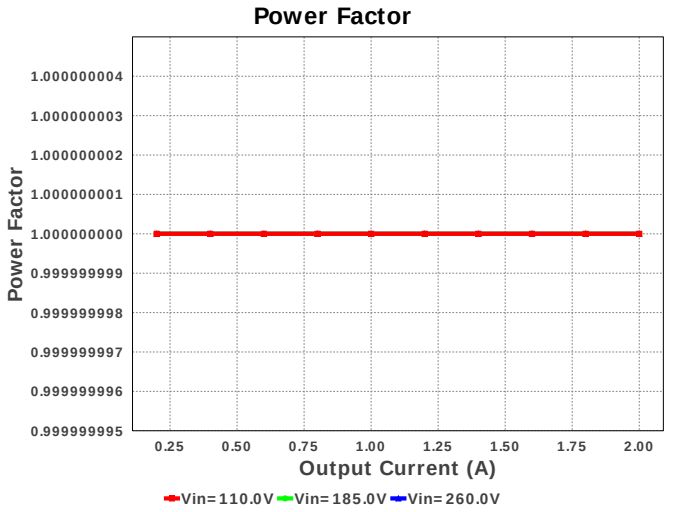


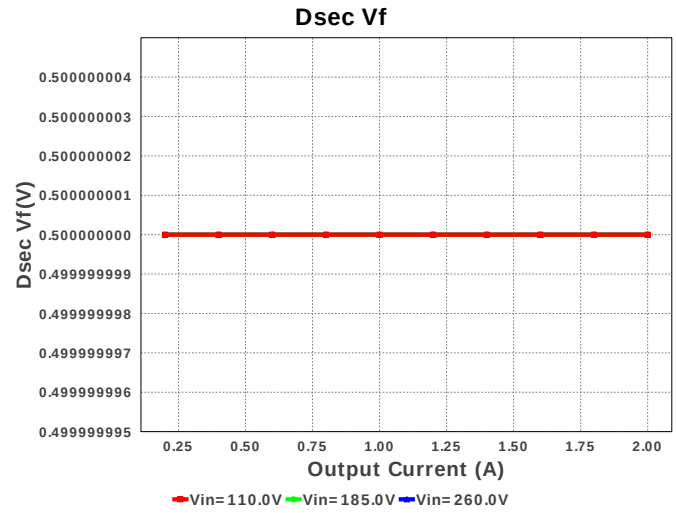


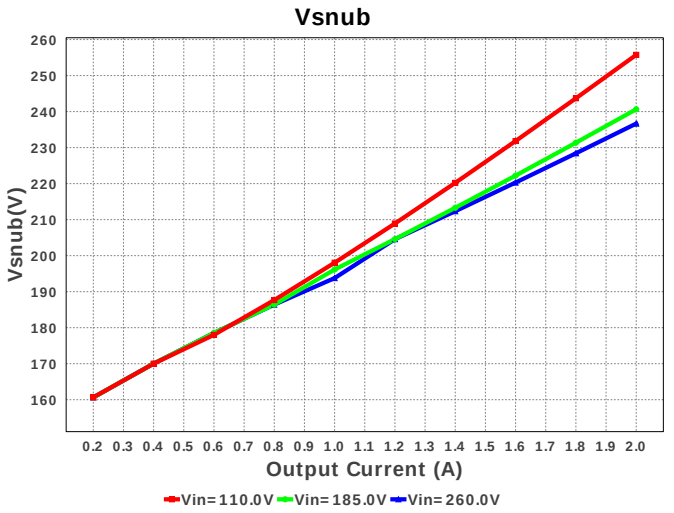


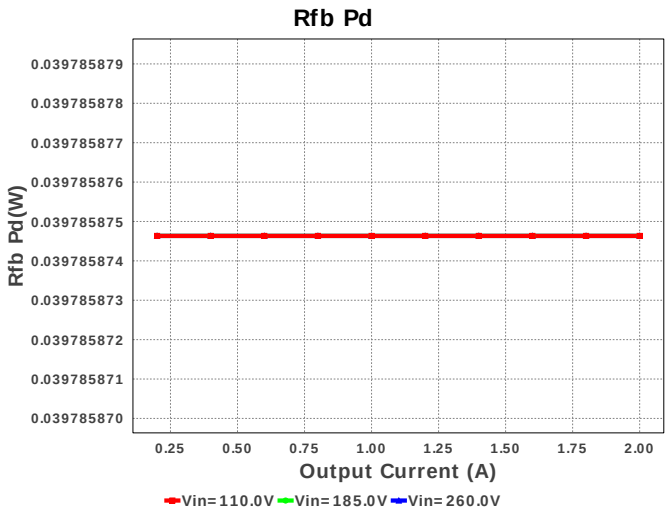


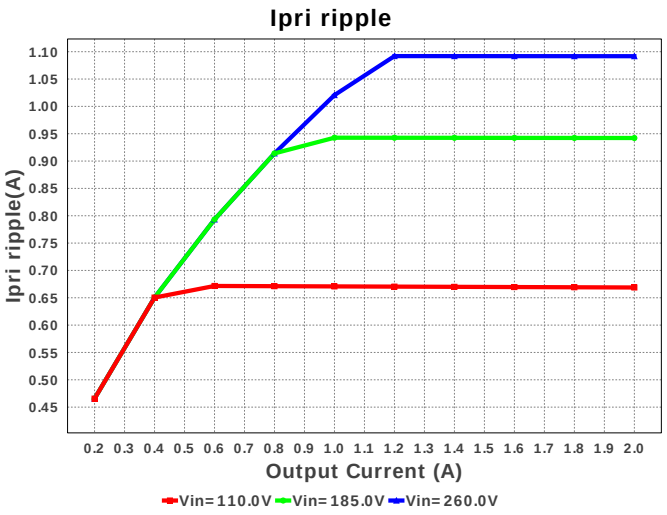


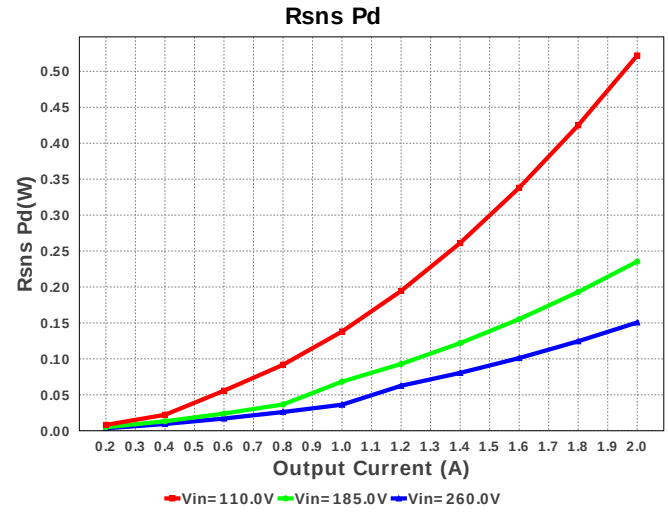


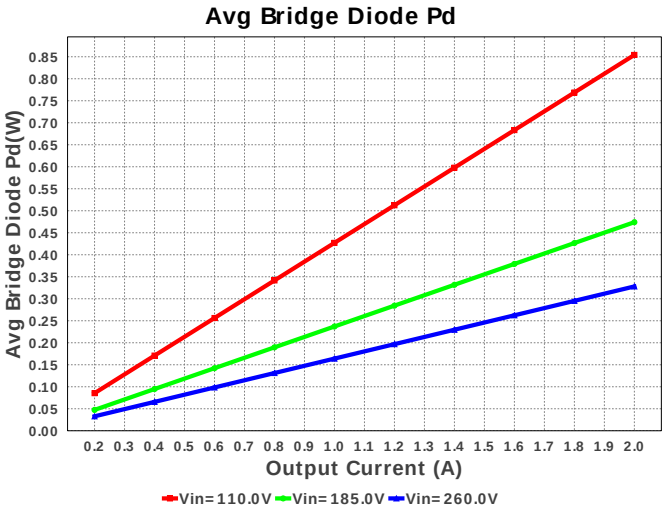


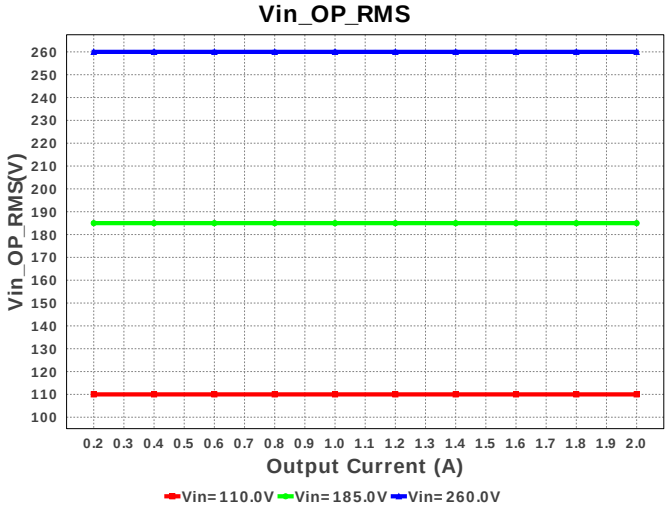


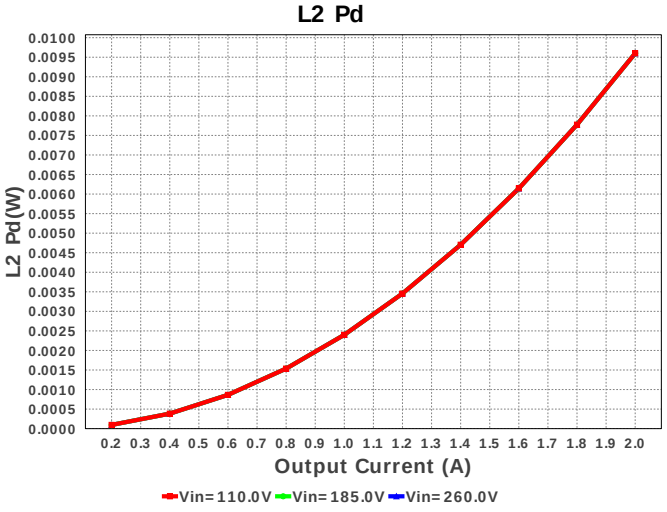


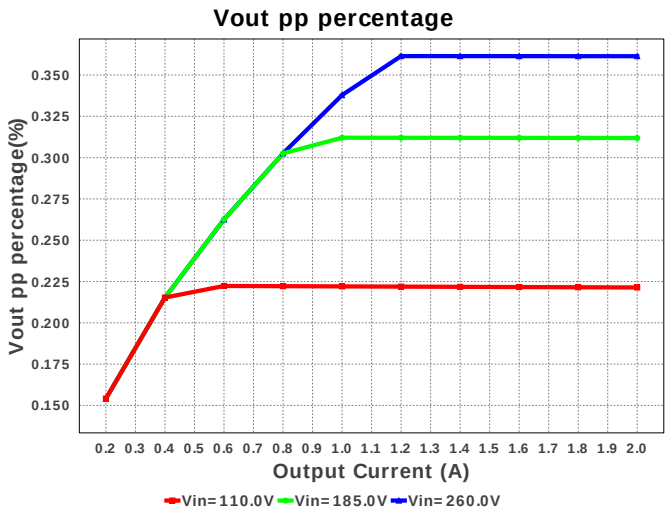


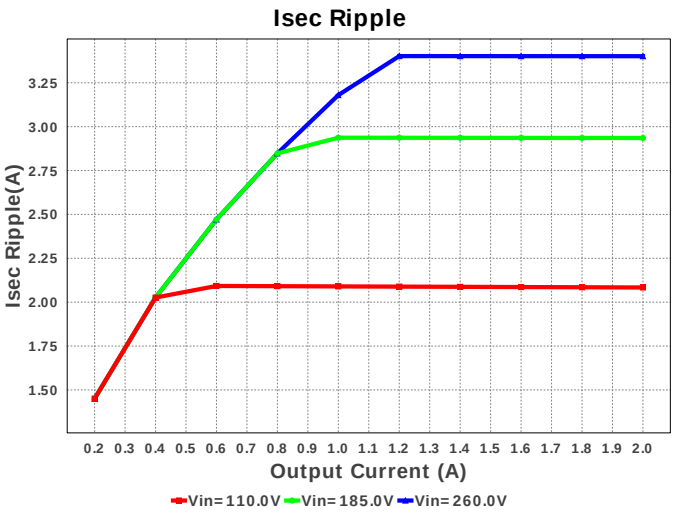


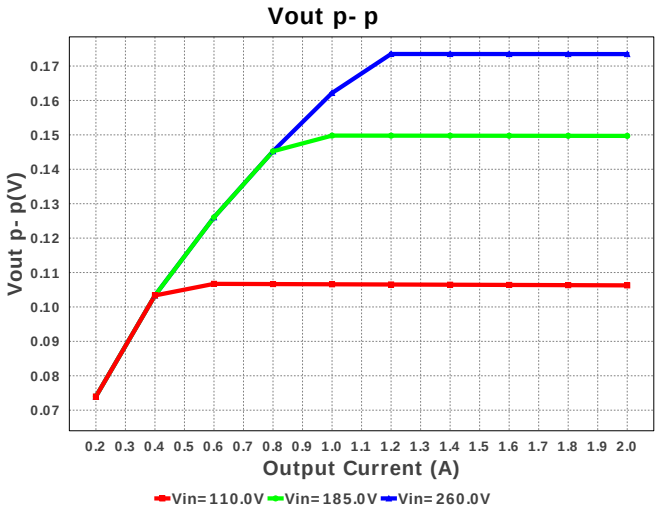


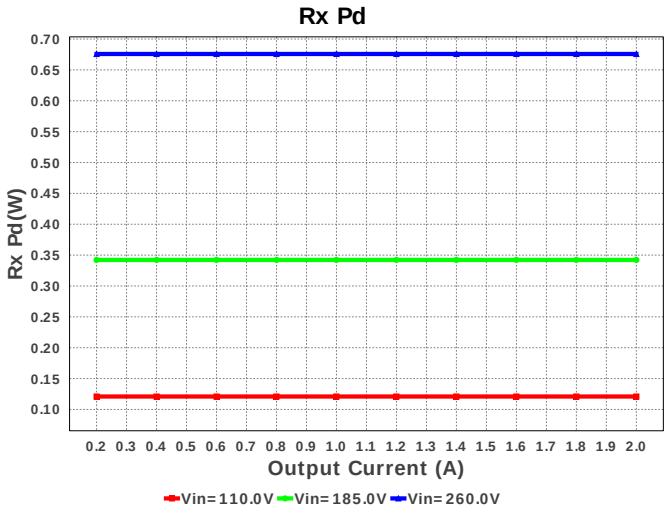


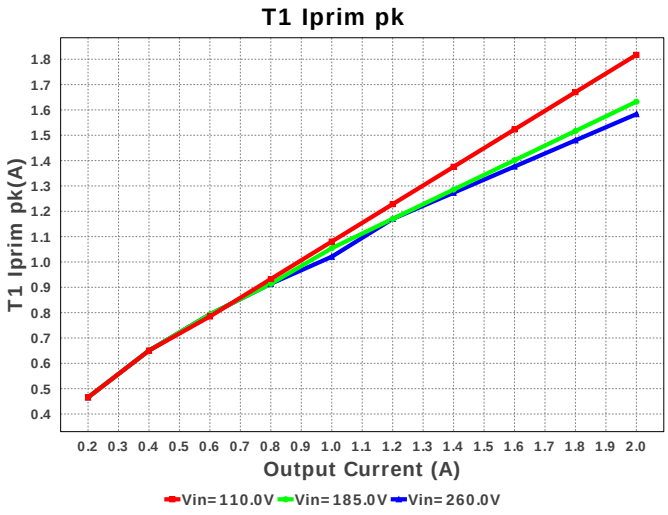












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	2.244 A	Current	Output capacitor1 RMS ripple current
2.	Iin rms	984.63 mA	Current	RMS Input Current
3.	Iout_DCM	447.286 mA	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	865.453 mA	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	668.81 mA	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	45.103 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	2.084 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	1.142 A	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	1.817 A	Current	Transformer Primary Peak Current

#	Name	Value	Category	Description
10.	T1 Is1 RMS	3.006 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	5.662 A	Current	Transformer Secondary1 Peak Current
12.	AC Frequency	60.0 Hz	General	Input AC frequency
13.	BOM Count	64	General	Total Design BOM count
14.	Daux trr	0.0 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	35.0 ns	General	Snubber Diode Reverse Recovery Time
19.	FootPrint	7.328 k mm^2	General	Total Foot Print Area of BOM components
20.	Frequency	42.786 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	10.118 us	General	Approximate Converter Off Time
25.	Ton Act	13.641 us	General	Approximate Converter On Time
26.	Total BOM	$0.0	General	Total BOM Cost
27.	Tsw	23.372 us	General	Switching Time Period
28.	Vaux	15.96 V	General	Auxiliary Voltage
29.	Vsnub	255.75 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	58.364 %	Op_point	Duty cycle
33.	Efficiency	88.635 %	Op_point	Steady state efficiency
34.	IC Tj	60.569 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	107.166 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	106.269 mV	Op_point	Peak-to-peak output ripple voltage
41.	Avg Bridge Diode Pd	854.142 mW	Power	Average Power Dissipation in the Bridge Diode over the AC Line Period
42.	Cbulk Pd	2.756 W	Power	Bulk capacitor power dissipation
43.	Cout1 Pd	256.89 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	277.904 mW	Power	IC power dissipation
49.	L1 Pd	461.274 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	1.235 W	Power	M1 MOSFET total power dissipation
52.	Paux	27.36 mW	Power	Power Dissipation in Raux and Daux
53.	Pd Rstartup	1.518 W	Power	Power Dissipation in Rstartup1 and Rstartup2
54.	Rdrv Pd	8.054 µW	Power	Power Dissipation in Gate Drive Resistor
55.	Rfb Pd	39.786 mW	Power	Rfb Power Dissipation
56.	Rsns Pd	522.037 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	1.882 W	Power	Snubber Power Dissipation
59.	T1 Pd	2.426 W	Power	Estimated Losses in Transformer
60.	Total Pd	12.309 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	221.393 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	260.0	Maximum input voltage
3.	VinMin	110.0	Minimum input voltage
4.	Vout	48.0	Output Voltage
5.	acFrequency	60.0	Light Output in Lumen
6.	base_pn	UC3842	Texas Instruments Base Part Number
7.	source	AC	Input Source Type
8.	ta	30.0	Ambient temperature

Design Assistance

1. UC3842 Product Folder : http://www.ti.com/product/UC3842 : contains the data sheet and other resources.