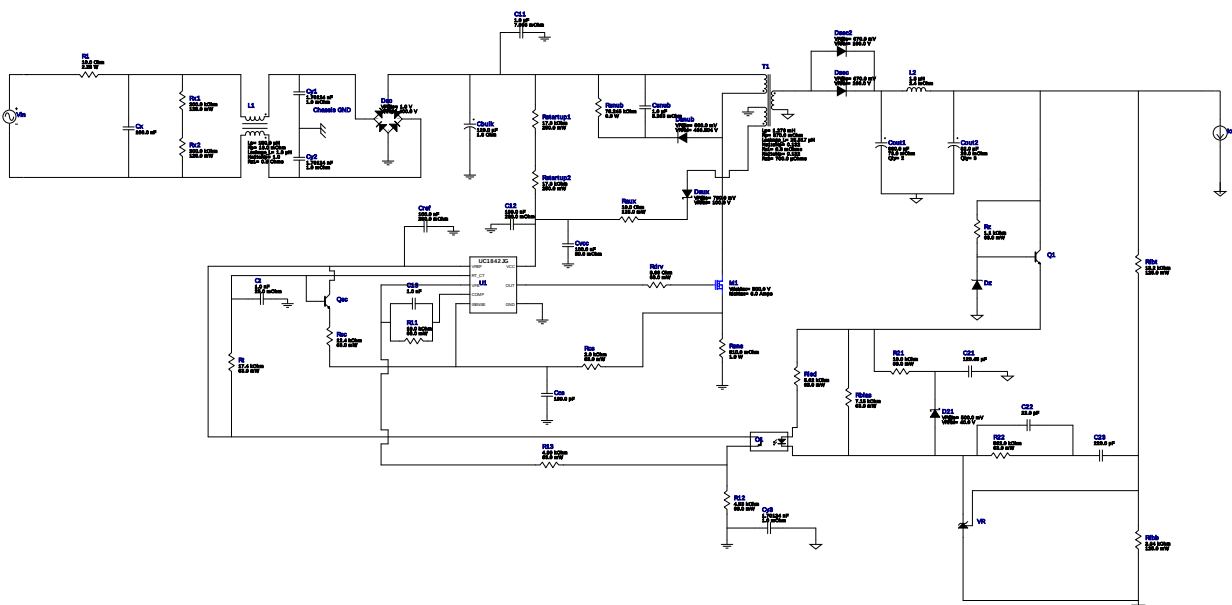


WEBENCH® Design Report

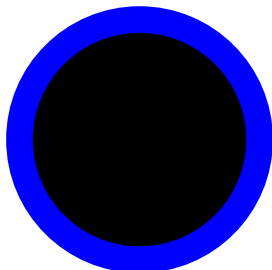
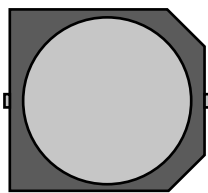
Design : 4551144/149 UC1842J
UC1842J 80.0V-130.0V to 15.00V @ 2.0A

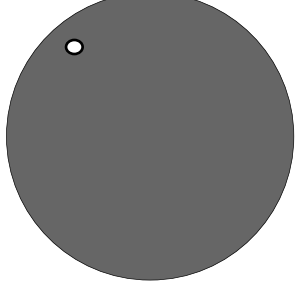
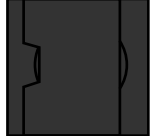
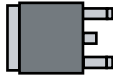


1. The EMI filter selected here contains the estimated values. The real numbers will depend on the attenuation needed at a particular frequency.

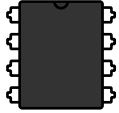
Electrical BOM

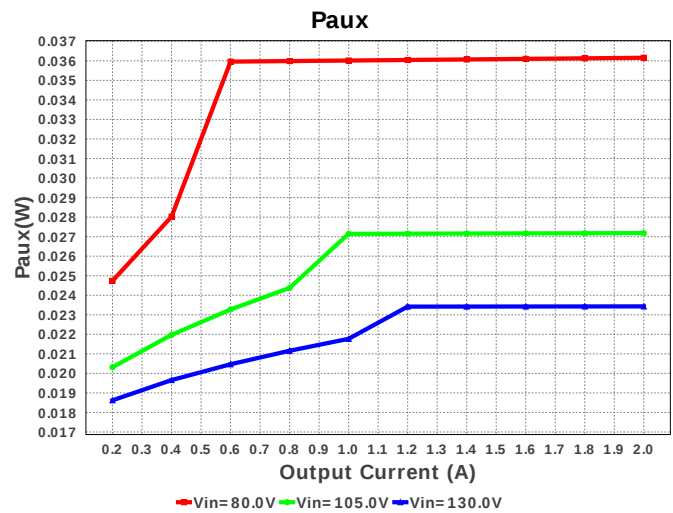
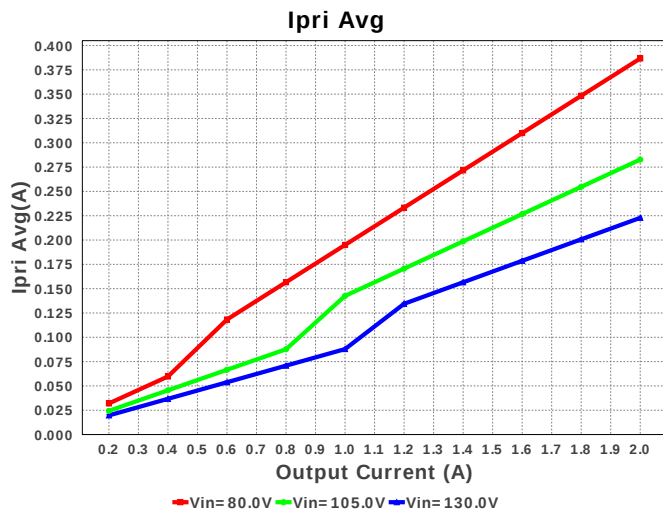
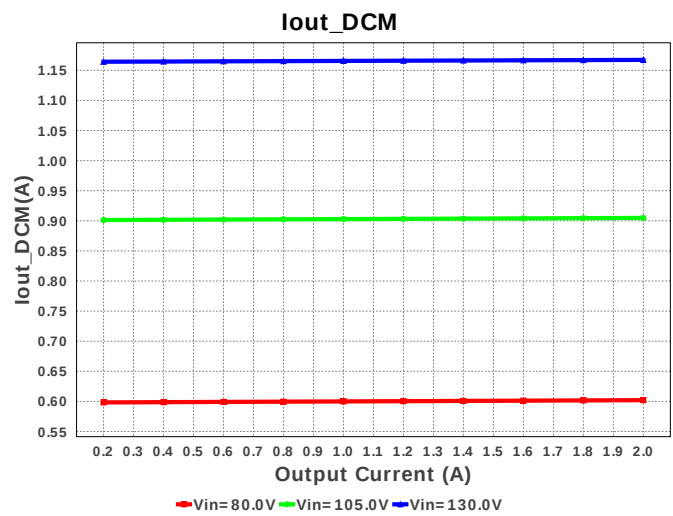
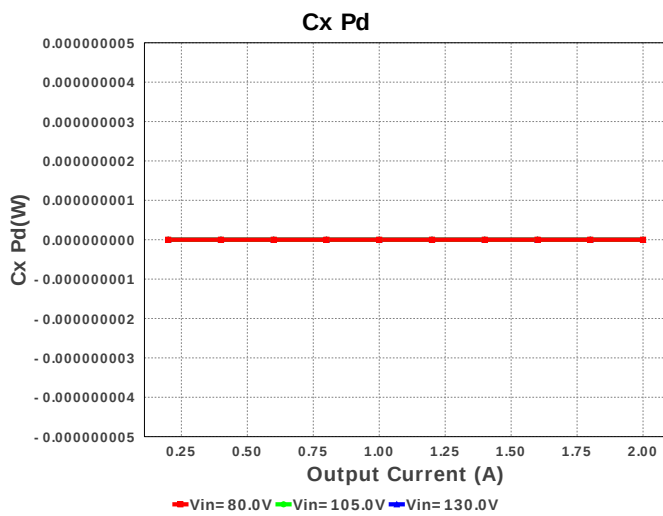
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C11	MuRata	GRM55DR72E105KW01L Series= X7R	Cap= 1.0 uF ESR= 7.086 mOhm VDC= 250.0 V IRMS= 2.0605 A	1	\$0.26	 2220_200 54 mm ²
2.	C12	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm 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= 120.45 uF VDC= 24.0 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	Yageo America	CC0805JRNPO9BN221 Series= C0G/NP0	Cap= 220.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²

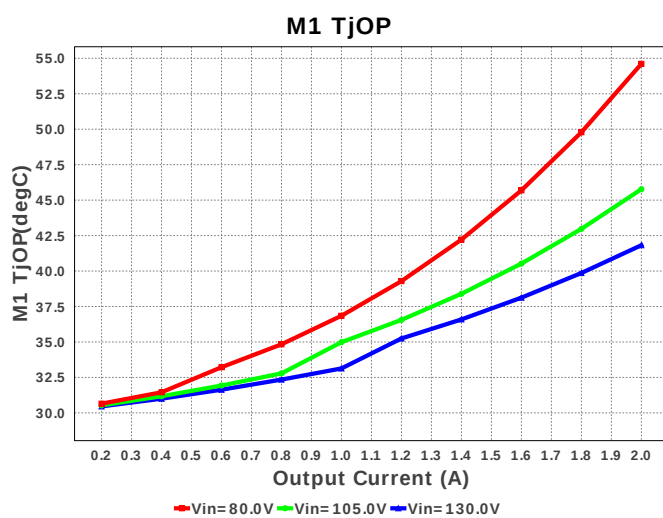
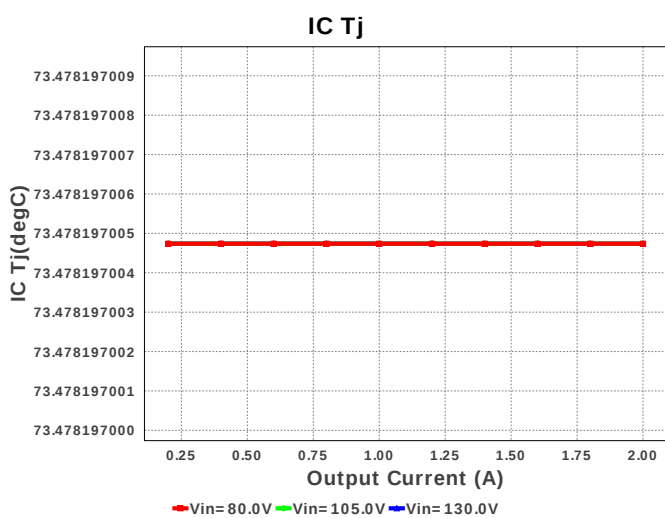
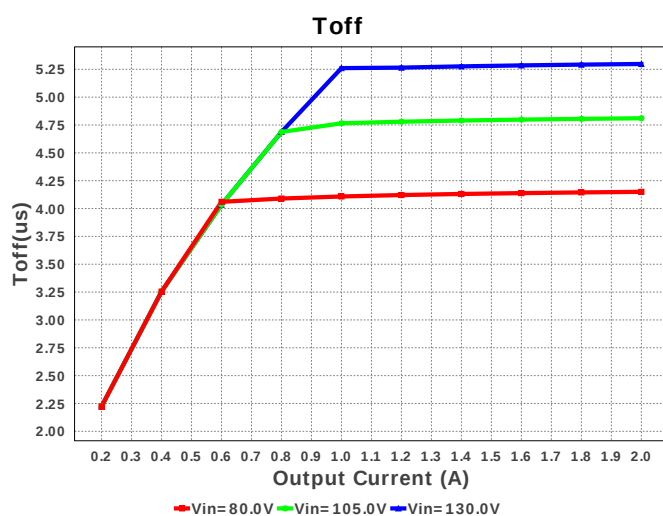
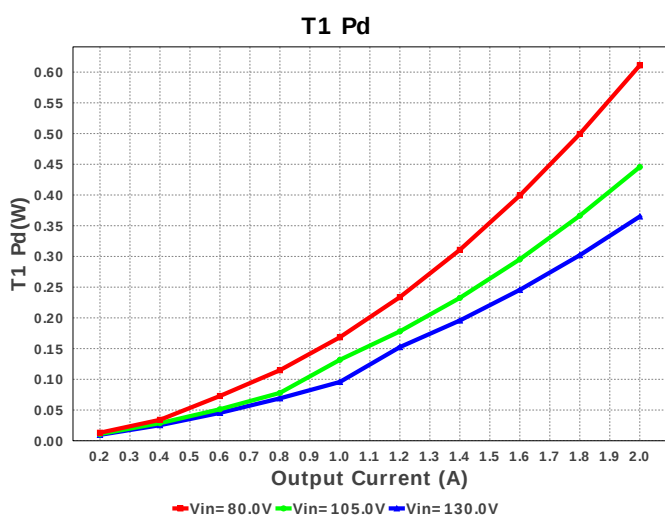
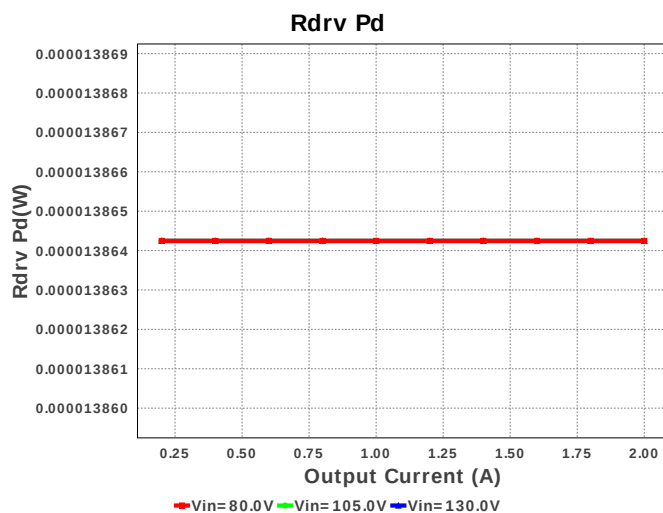
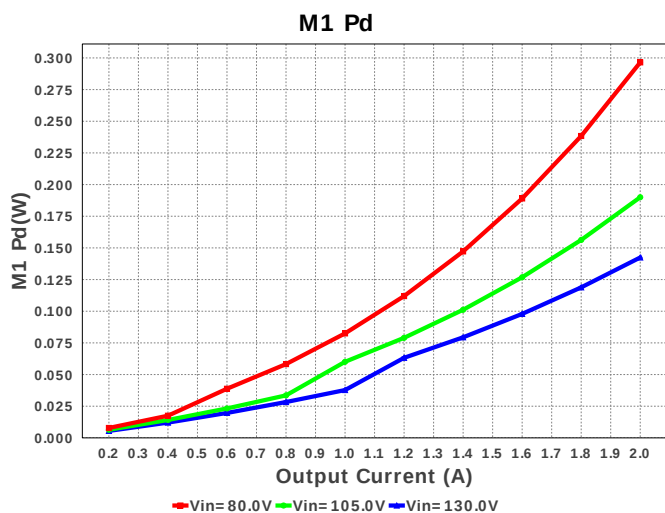
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	Cbulk	Vishay-Bccomponents	MAL215757121E3 Series= 2239	Cap= 120.0 uF ESR= 1.6 Ohm VDC= 450.0 V IRMS= 1.09 A	1	\$3.90	 157PUM-SI_2500x3000 729 mm ²
8.	Ccs	Kemet	C0805C181K5GACTU Series= C0G/NP0	Cap= 180.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
9.	Cout1	Panasonic	EEV-FK1H681M Series= FK	Cap= 680.0 uF ESR= 73.0 mOhm VDC= 50.0 V IRMS= 1.61 A	2	\$0.74	 SM_RADIAL_J16 399 mm ²
10.	Cout2	Panasonic	35SVPF82M Series= ?	Cap= 82.0 uF ESR= 20.0 mOhm VDC= 35.0 V IRMS= 4.0 A	3	\$0.61	 CAPSMT_62_E12 106 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.	Csnub	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
13.	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
14.	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 mm ²
15.	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
16.	Cy1	CUSTOM	CUSTOM Series= ?	Cap= 1.70124 nF ESR= 1.0 mOhm VDC= 220.62 V IRMS= 500.0 uA	1	NA	CUSTOM 0 mm ²
17.	Cy2	CUSTOM	CUSTOM Series= ?	Cap= 1.70124 nF ESR= 1.0 mOhm VDC= 220.62 V IRMS= 500.0 uA	1	NA	CUSTOM 0 mm ²
18.	Cy3	CUSTOM	CUSTOM Series= ?	Cap= 1.70124 nF ESR= 1.0 mOhm VDC= 220.62 V IRMS= 500.0 uA	1	NA	CUSTOM 0 mm ²
19.	D21	Vishay-Semiconductor	SS14-E3/61T	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.08	 SMA 37 mm ²

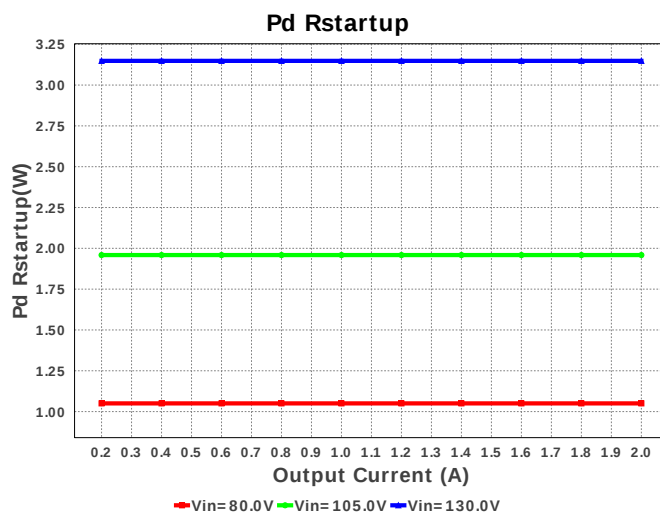
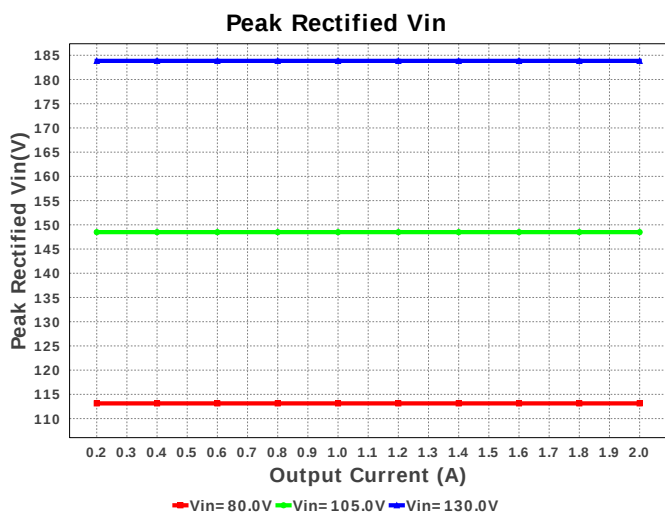
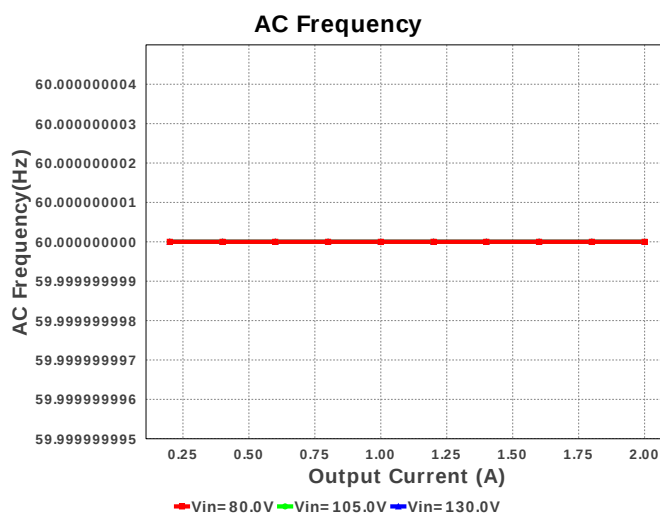
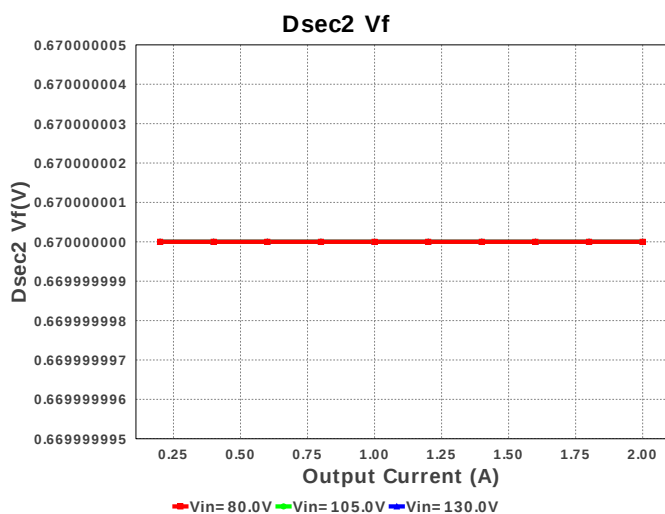
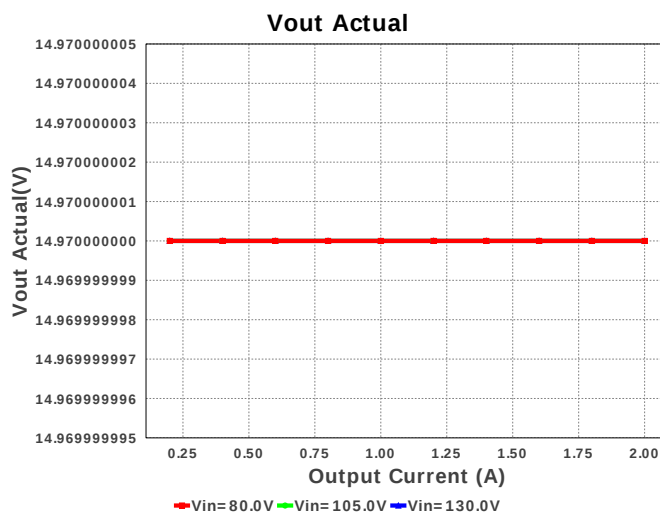
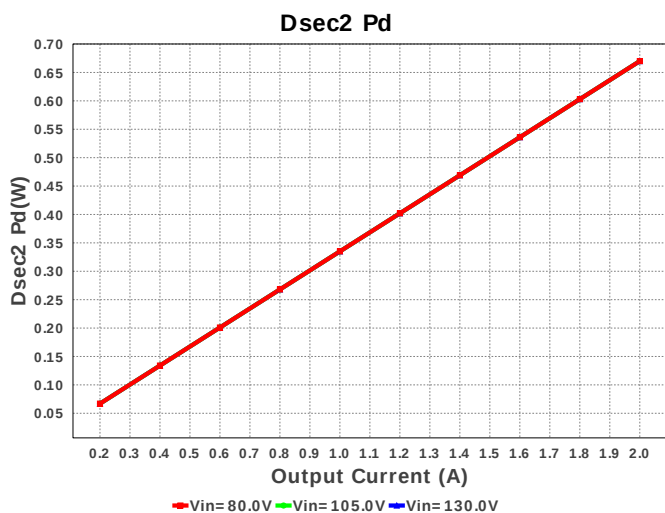
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
20.	Dac	Diodes Inc.	HD04-T	VF@Io= 1.0 V VRRM= 400.0 V	1	\$0.12	 MiniDIP 62 mm²
21.	Daux	Diodes Inc.	B1100-13-F	VF@Io= 790.0 mV VRRM= 100.0 V	1	\$0.10	 SMA 37 mm²
22.	Dsec	Fairchild Semiconductor	FSV8100V	VF@Io= 670.0 mV VRRM= 100.0 V	1	\$0.21	 TO-277A 56 mm²
23.	Dsec2	Fairchild Semiconductor	FSV8100V	VF@Io= 670.0 mV VRRM= 100.0 V	1	\$0.21	 TO-277A 56 mm²
24.	Dsnub	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 466.804 V	1	NA	CUSTOM 0 mm²
25.	Dz	Diodes Inc.	MMSZ5242B-7-F	Zener	1	\$0.04	 SOD-123 13 mm²
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	\$6.32	 CM6296 833 mm²
27.	L2	Coilcraft	SER1360-182KLB	L= 1.8 µH DCR= 2.4 mOhm	1	\$0.72	 SER1360 225 mm²
28.	M1	Fairchild Semiconductor	FDD6N50TM	VdsMax= 500.0 V IdsMax= 6.0 Amps	1	\$0.47	 DPAK 102 mm²
29.	O1	Vishay-Semiconductor	TCMT1107	Optocoupler	1	\$0.21	 SOP-4 44 mm²
30.	Q1	ON Semiconductor	BC846BLT1G	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm²
31.	Qsc	STMicroelectronics	2N2222A	Bipolar Transistor	1	NA	 TO-18 57 mm²
32.	R1	Vishay-Dale	AC03000001009JACCS Series= F_RES	Res= 10.0 Ohm Power= 2.25 W Tolerance= 5.0%	1	\$0.30	 AC03 158 mm²
33.	R11	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
34.	R12	Vishay-Dale	CRCW04024K53FKED Series= CRCW..e3	Res= 4.53 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

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
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	CRCW0402562KFKED Series= CRCW..e3	Res= 562.0 kOhm 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	Vishay-Dale	CRCW04027K15FKED Series= CRCW..e3	Res= 7.15 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 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	Yageo America	RT0805BRD072K64L Series= ?	Res= 2.64 kOhm Power= 125.0 mW Tolerance= 0.1%	1	\$0.04	 0805 7 mm²
43.	Rfbb	Yageo America	RT0805BRD0713K2L Series= RT0805	Res= 13.2 kOhm Power= 125.0 mW Tolerance= 0.1%	1	\$0.05	 0805 7 mm²
44.	Rled	Vishay-Dale	CRCW04025K62FKED Series= CRCW..e3	Res= 5.62 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
45.	Rsc	Vishay-Dale	CRCW040212K4FKED Series= CRCW..e3	Res= 12.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
46.	Rsns	Bourns	CRM2010-FX-R910ELF Series= ?	Res= 910.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	\$0.09	 2010 32 mm²
47.	Rsns	CUSTOM	CUSTOM Series= ?	Res= 76.245 kOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
48.	Rstart1	Panasonic	ERJ-8ENF1782V Series= ERJ-8E	Res= 17.8 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
49.	Rstart2	Panasonic	ERJ-8ENF1782V Series= ERJ-8E	Res= 17.8 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
50.	Rt	Vishay-Dale	CRCW040217K4FKED Series= CRCW..e3	Res= 17.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
51.	Rx1	Panasonic	ERJ-6ENF2003V Series= ERJ-6E	Res= 200.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
52.	Rx2	Panasonic	ERJ-6ENF2003V Series= ERJ-6E	Res= 200.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
53.	Rz	Vishay-Dale	CRCW04021K10FKED Series= CRCW..e3	Res= 1.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
54.	T1	CUSTOM	CUSTOM	Lp= 1.276 mH Rp= 870.0 mOhm Leakage_L= 25.517 µH Ns1toNp= 0.132 Rs1= 8.6 mOhms Ns2toNp= 0.132 Rs2= 700.0 µOhms	1	NA	CUSTOM 0 mm²

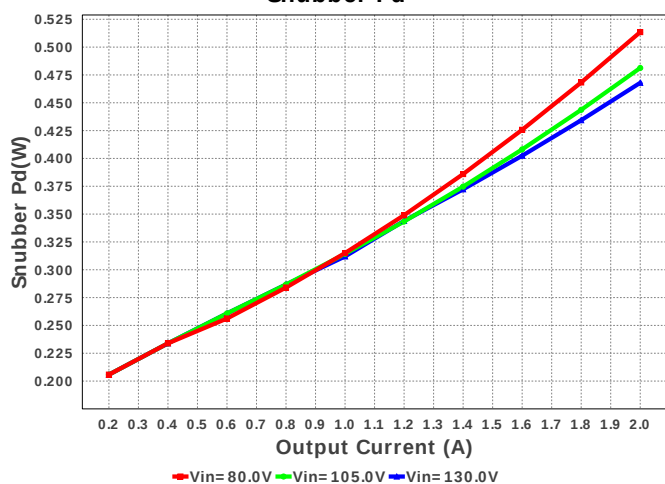
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
55.	U1	Texas Instruments	UC1842J	Switcher	1	\$9.18	 JG0008A 111 mm ²
56.	VR	Texas Instruments	TL431AIDBZR	Voltage References	1	\$0.08	 DBZ0003A 14 mm ²



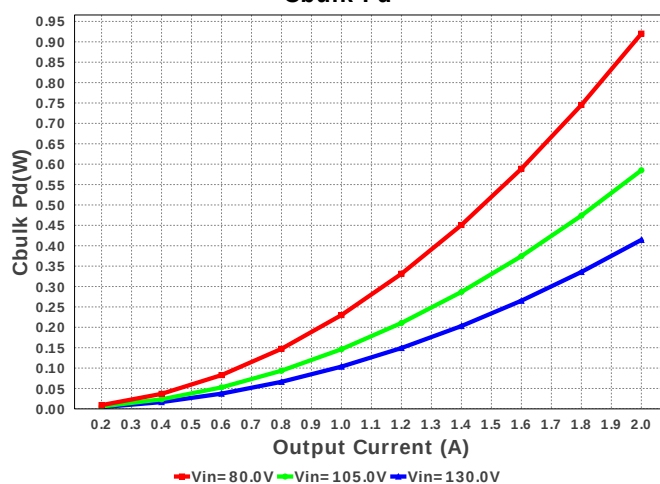




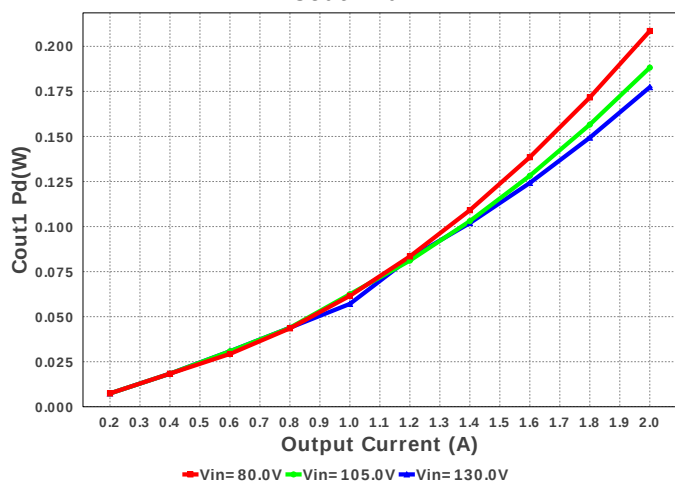
Snubber Pd



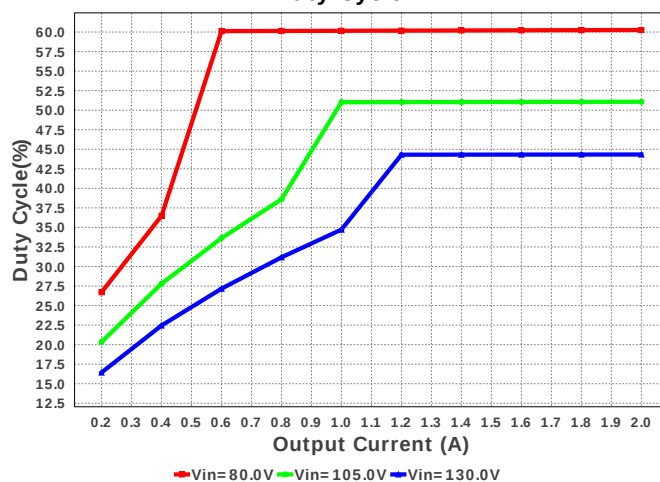
Cbulk Pd



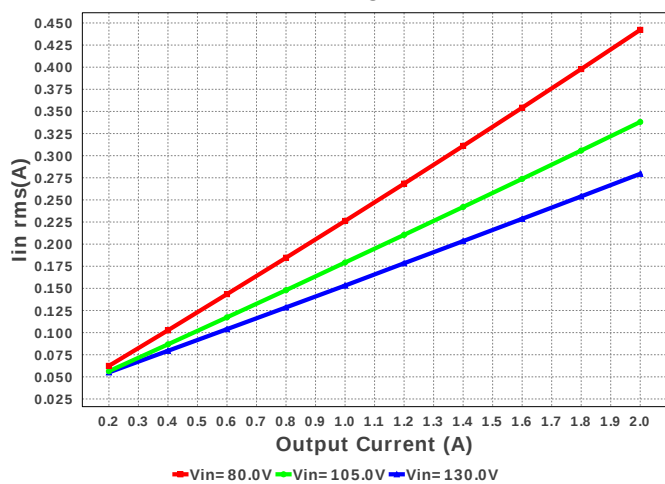
Cout1 Pd



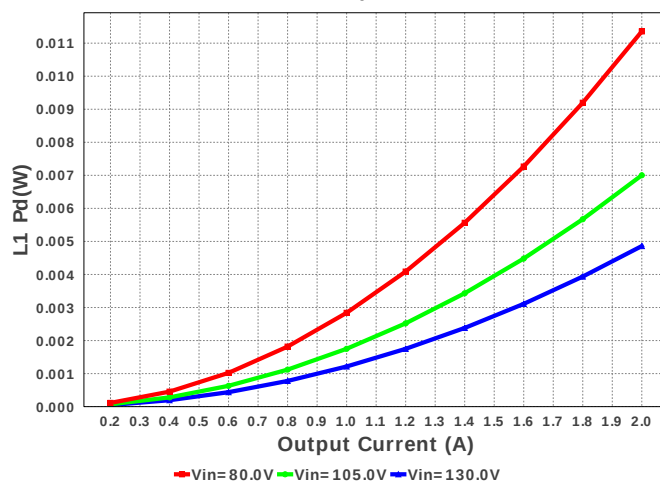
Duty Cycle

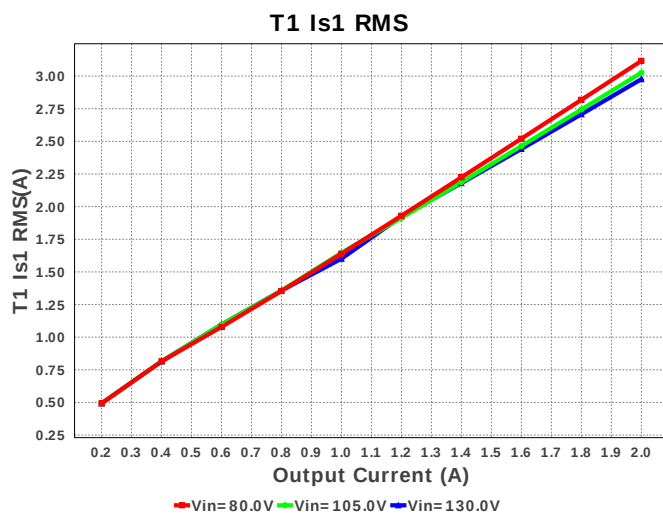
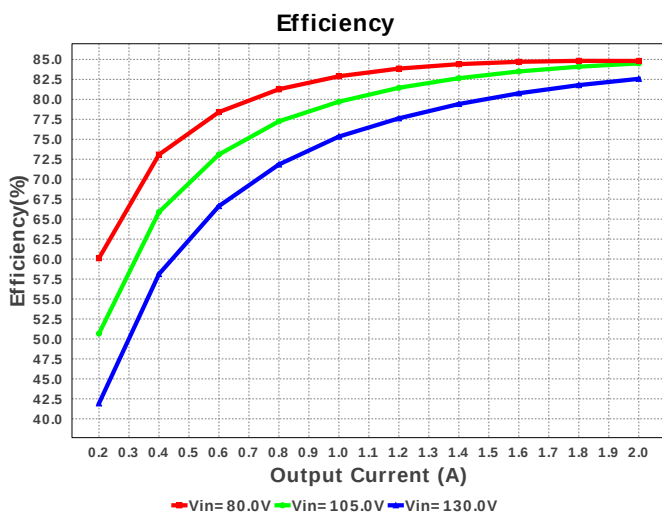
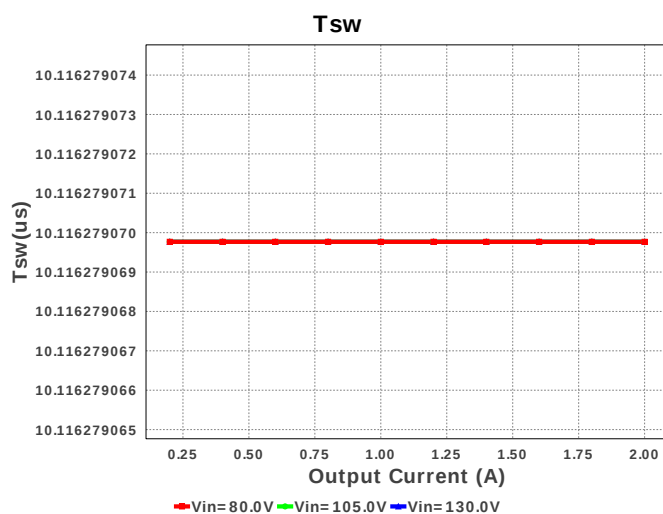
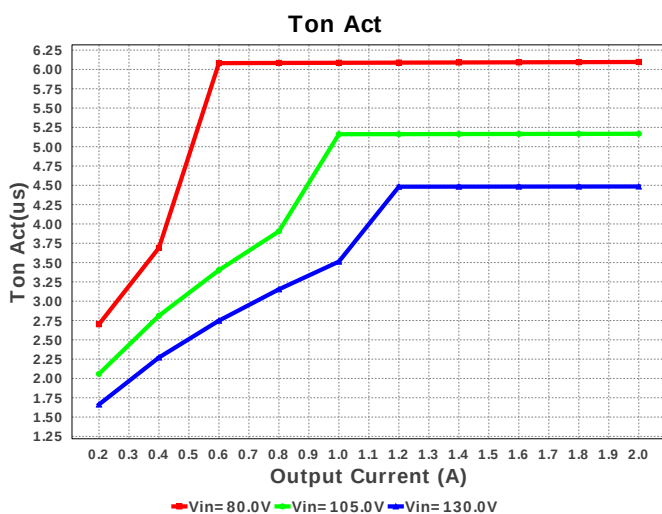
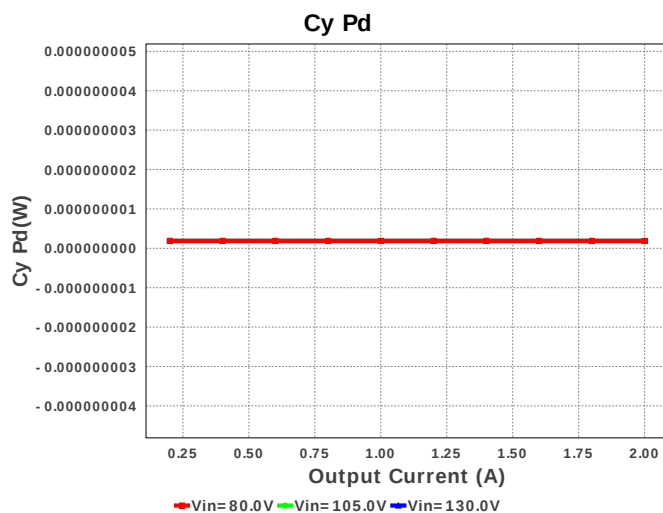
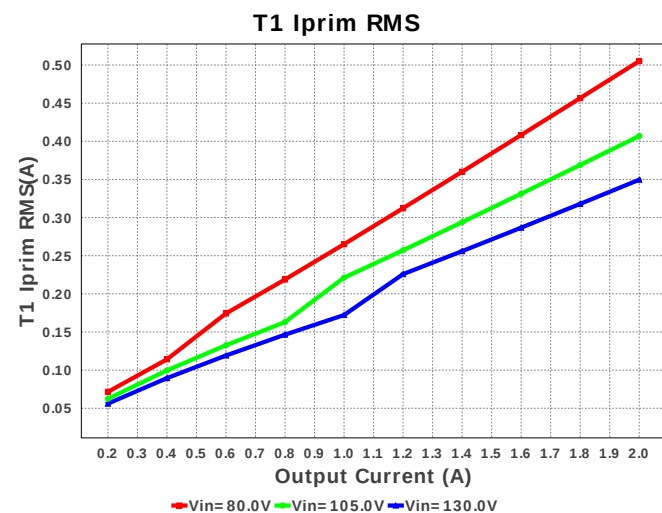


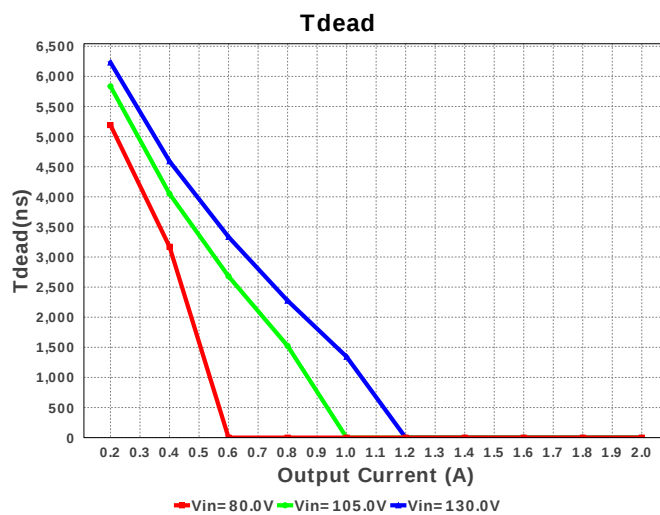
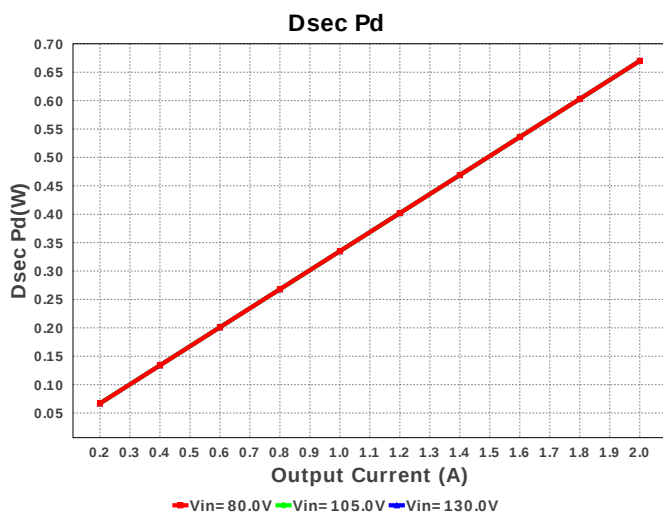
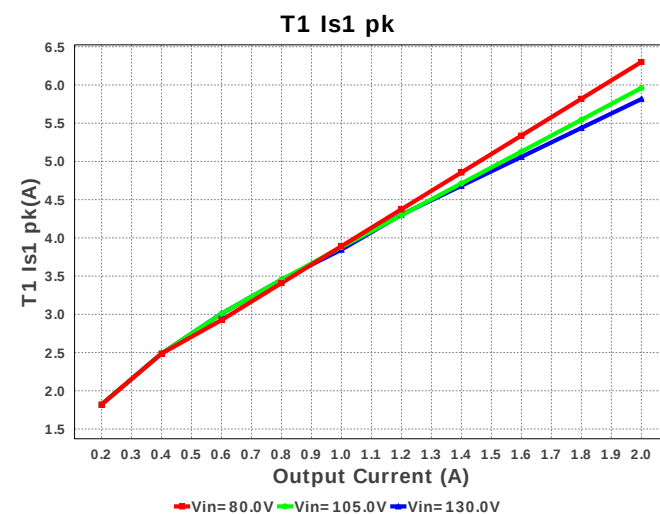
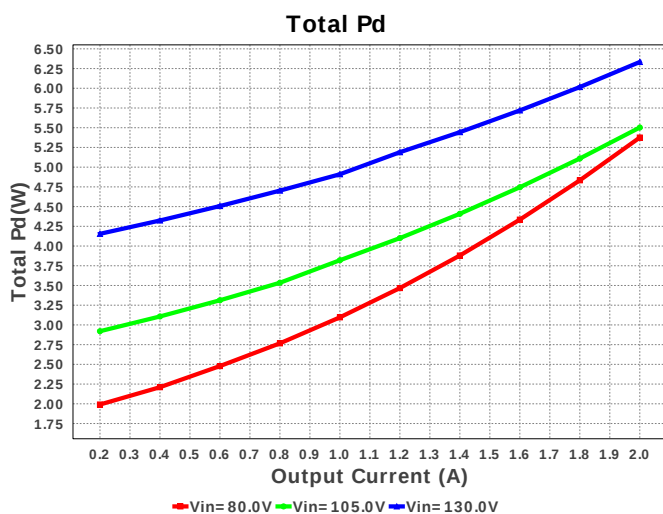
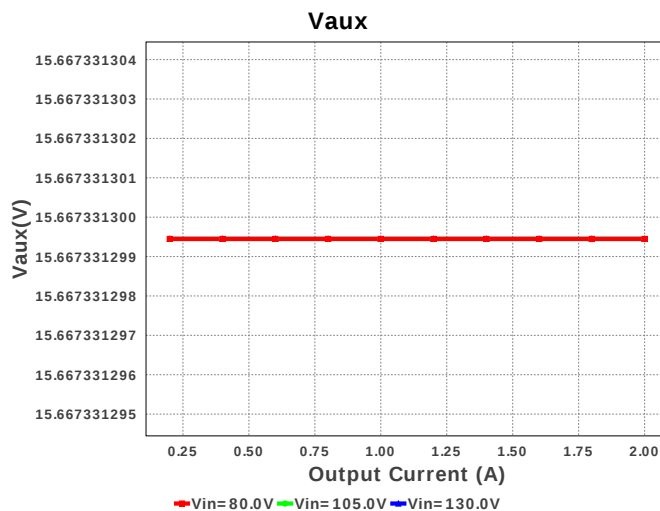
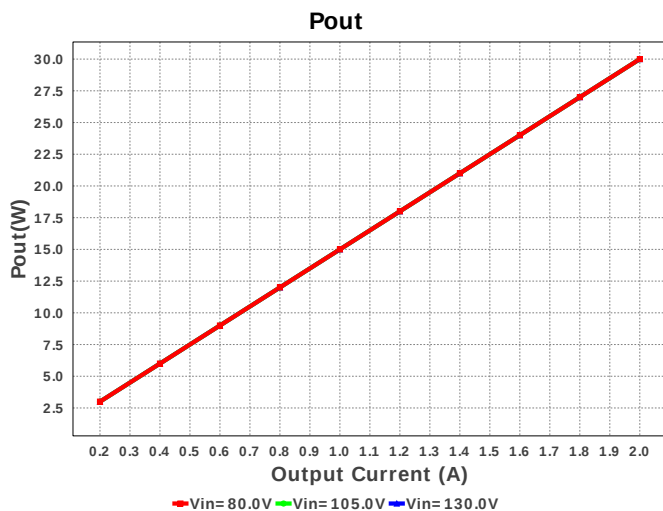
Iin rms

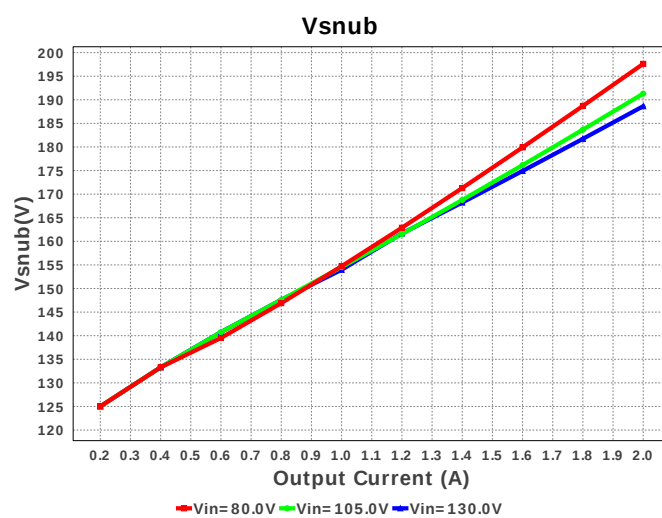
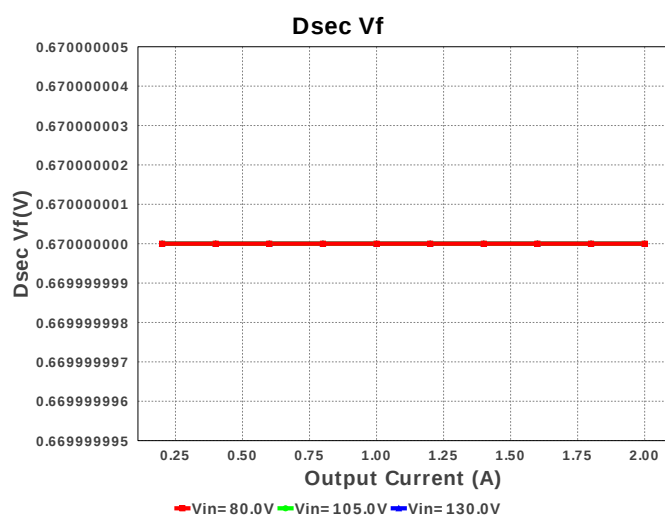
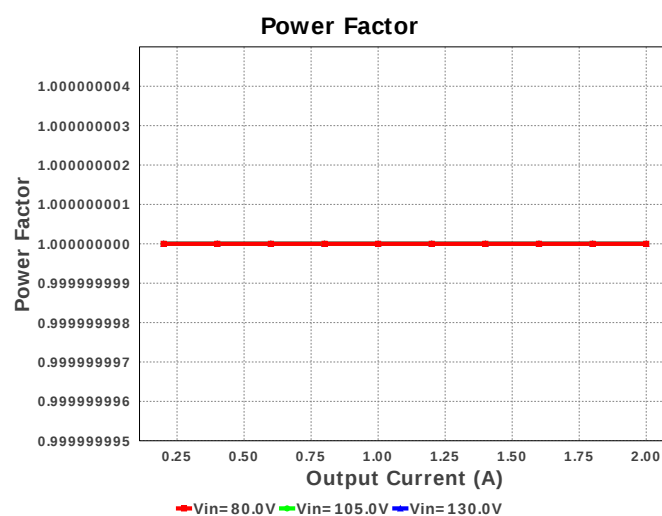
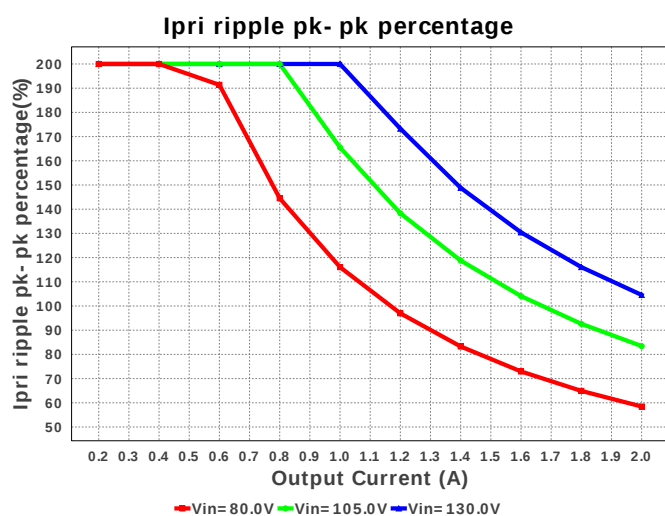
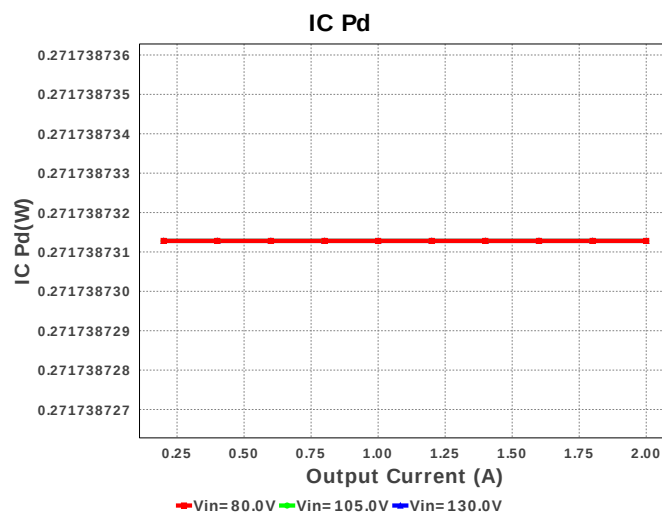
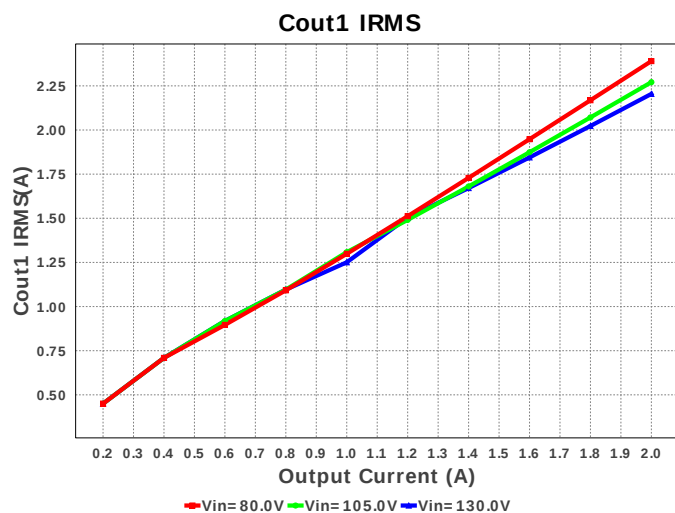


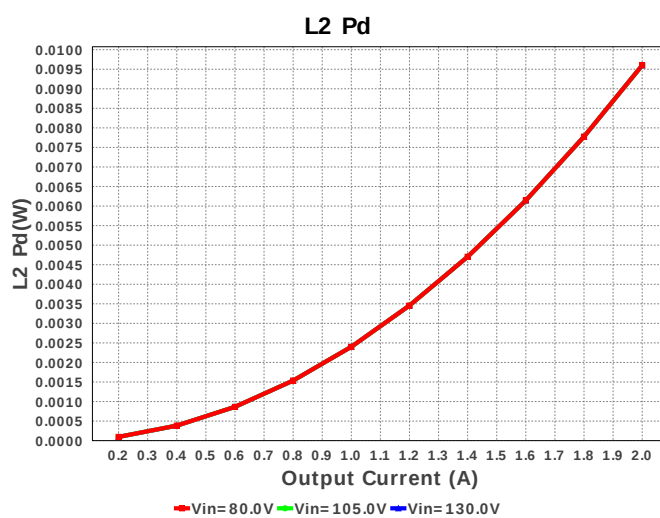
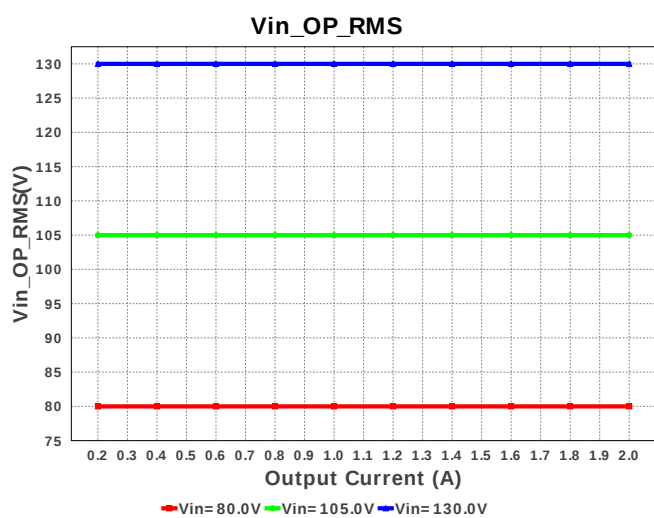
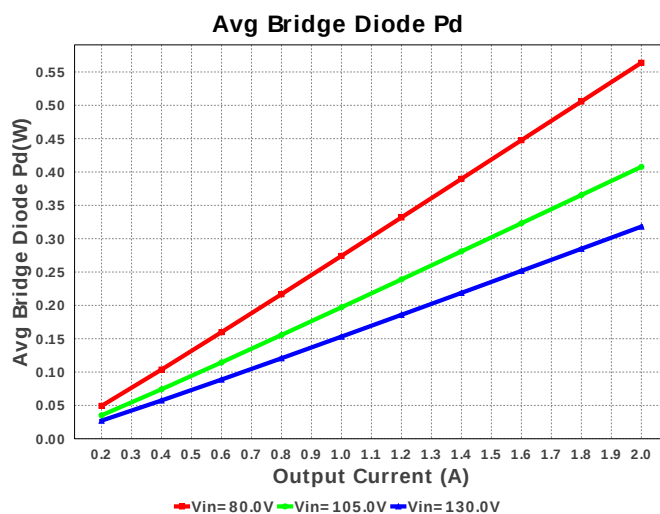
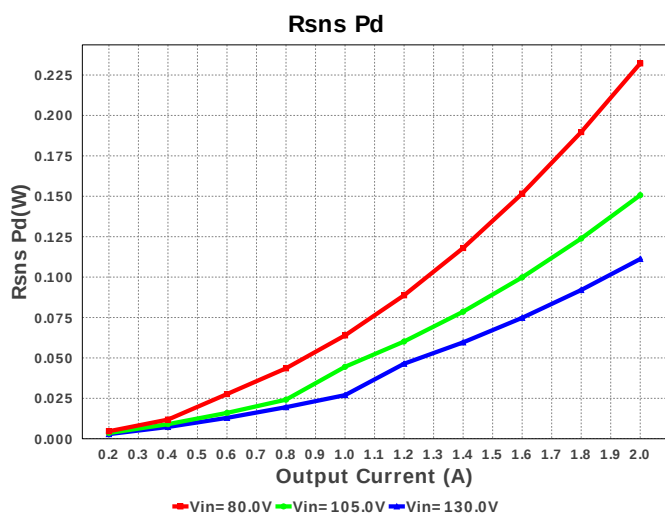
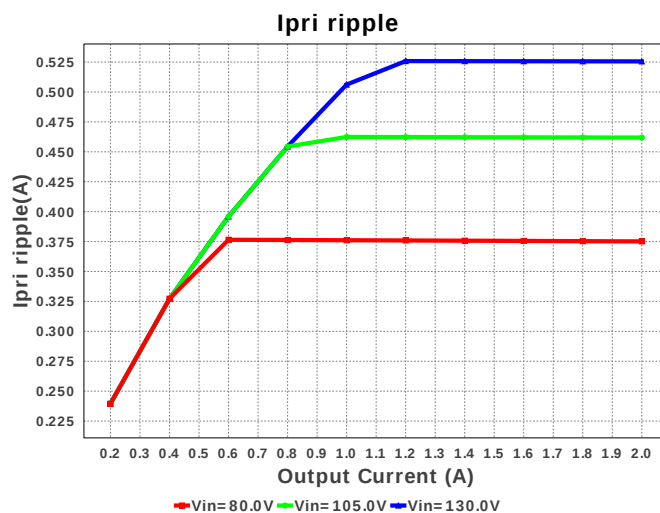
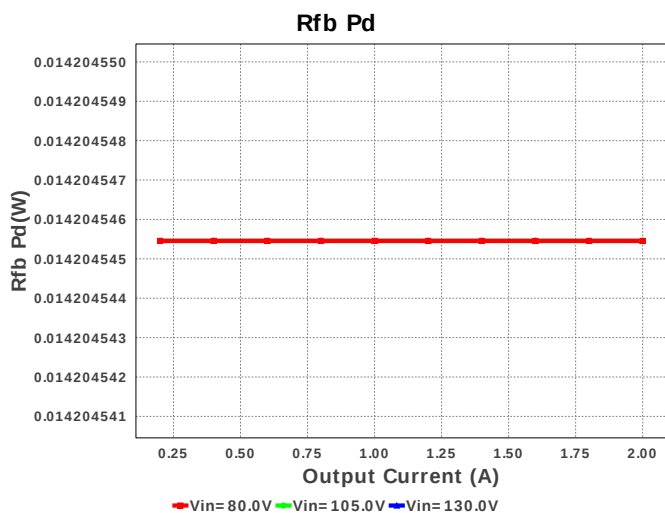
L1 Pd

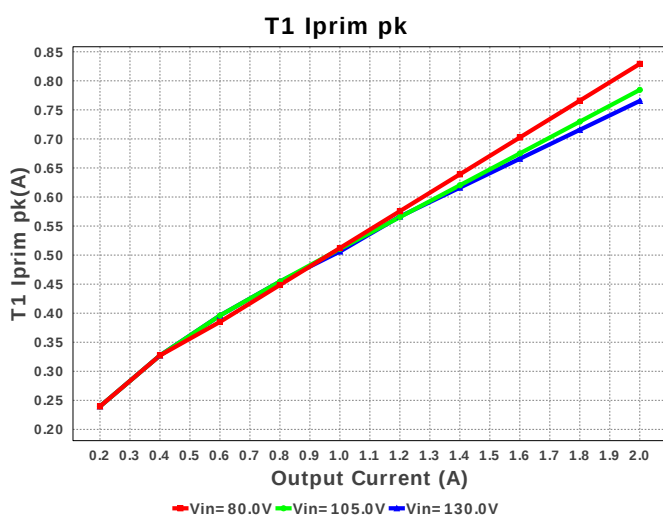
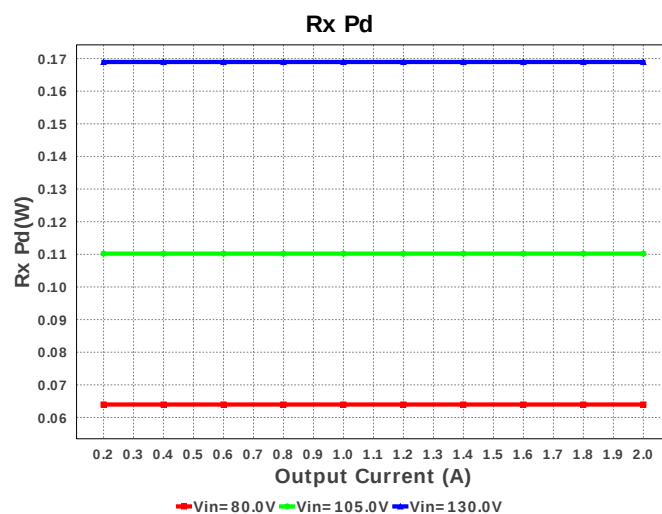
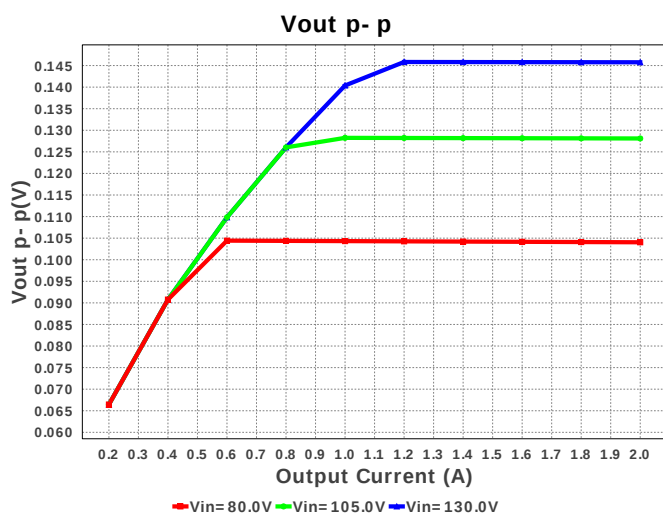
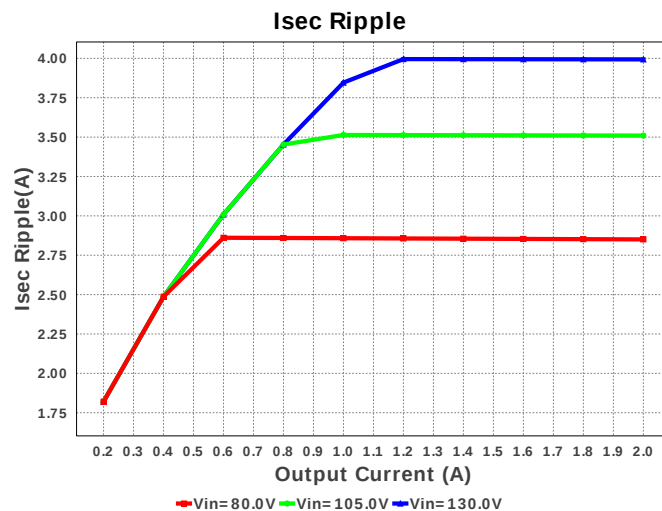
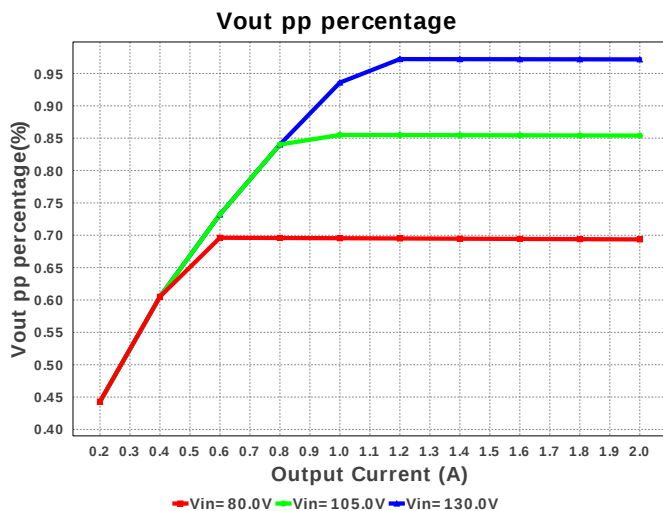












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	2.39 A	Current	Output capacitor1 RMS ripple current
2.	Iin rms	442.19 mA	Current	RMS Input Current
3.	Iout_DCM	602.044 mA	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	386.666 mA	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	375.144 mA	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	58.469 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	2.85 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	505.131 mA	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	829.185 mA	Current	Transformer Primary Peak Current

#	Name	Value	Category	Description
10.	T1 Is1 RMS	3.117 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	6.3 A	Current	Transformer Secondary1 Peak Current
12.	AC Frequency	60.0 Hz	General	Input AC frequency
13.	BOM Count	59	General	Total Design BOM count
14.	Daux trr	0.0 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	670.0 mV	General	Effective Forward Voltage Drop at the Operating Current
18.	Dsnub trr	0.0 ns	General	Snubber Diode Reverse Recovery Time
19.	FootPrint	4.211 k mm ²	General	Total Foot Print Area of BOM components
20.	Frequency	98.851 kHz	General	Switching frequency
21.	Mode	CCM	General	Conduction Mode
22.	Pout	30.0 W	General	Total output power
23.	Power Factor	1.0	General	Assumed Power Factor for the Application
24.	Tdead	0.0 ns	General	Approximate Dead Time of the Regulator
25.	Toff	4.15 us	General	Approximate Converter Off Time
26.	Ton Act	6.097 us	General	Approximate Converter On Time
27.	Total BOM	\$0.0	General	Total BOM Cost
28.	Tsw	10.116 us	General	Switching Time Period
29.	Vaux	15.667 V	General	Auxiliary Voltage
30.	Vsnub	197.615 V	General	Voltage Across the Snubber
31.	Vout Actual	14.97 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
32.	Vout OP	15.0 V	Op_Point	Operational Output Voltage
33.	Duty Cycle	60.265 %	Op_point	Duty cycle
34.	Efficiency	84.804 %	Op_point	Steady state efficiency
35.	IC Tj	73.478 degC	Op_point	IC junction temperature
36.	ICThetaJA	160.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
37.	IOUT_OP	2.0 A	Op_point	Iout operating point
38.	M1 TJOP	54.607 degC	Op_point	M1 MOSFET junction temperature
39.	Peak Rectified Vin	113.136 V	Op_point	Peak voltage seen at rectified input
40.	Vin_OP_RMS	80.0 V	Op_point	AC Input RMS Voltage
41.	Vout p-p	104.043 mV	Op_point	Peak-to-peak output ripple voltage
42.	Avg Bridge Diode Pd	563.818 mW	Power	Average Power Dissipation in the Bridge Diode over the AC Line Period
43.	Cbulk Pd	920.024 mW	Power	Bulk capacitor power dissipation
44.	Cout1 Pd	208.539 mW	Power	Output capacitor1 power dissipation
45.	Cx Pd	0.0 W	Power	X-cap Power Dissipation
46.	Cy Pd	187.5 pW	Power	Y-caps Power Dissipation
47.	Dsec Pd	670.0 mW	Power	Secondary Diode Power Dissipation
48.	Dsec2 Pd	670.0 mW	Power	Secondary Diode Power Dissipation
49.	IC Pd	271.739 mW	Power	IC power dissipation
50.	L1 Pd	11.355 mW	Power	Power Dissipation in the Inductor
51.	L2 Pd	9.6 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
52.	M1 Pd	296.465 mW	Power	M1 MOSFET total power dissipation
53.	Paux	36.157 mW	Power	Power Dissipation in Raux and Daux
54.	Pd Rstartup	1.05 W	Power	Power Dissipation in Rstartup1 and Rstartup2
55.	Rdrv Pd	13.864 μW	Power	Power Dissipation in Gate Drive Resistor
56.	Rfb Pd	14.205 mW	Power	Rfb Power Dissipation
57.	Rsns Pd	232.193 mW	Power	Current Limit Sense Resistor Power Dissipation
58.	Rx Pd	63.979 mW	Power	Total Power Dissipation in Rx1 and Rx2
59.	Snubber Pd	513.484 mW	Power	Snubber Power Dissipation
60.	T1 Pd	611.047 mW	Power	Estimated Losses in Transformer
61.	Total Pd	5.376 W	Power	Total Power Dissipation
62.	Vout Tolerance	488.01 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
63.	Vout pp percentage	693.621 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	80.0	Minimum input voltage
4.	Vout	15.0	Output Voltage
5.	line_fsw	60.0	Light Output in Lumen
6.	base_pn	UC1842	Base Product Number
7.	source	AC	Input Source Type
8.	Ta	30.0	Ambient temperature

Design Assistance

1. **UC1842** Product Folder : <http://www.ti.com/product/UC1842> : contains the data sheet and other resources.

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.

Use of Texas Instruments' WEBENCH simulation tools is subject to [Texas Instruments' Site Terms and Conditions of Use](#). Prototype boards based on WEBENCH created designs are provided AS IS without warranty of any kind for evaluation and testing purposes and are subject to the terms of the [Evaluation License Agreement](#).