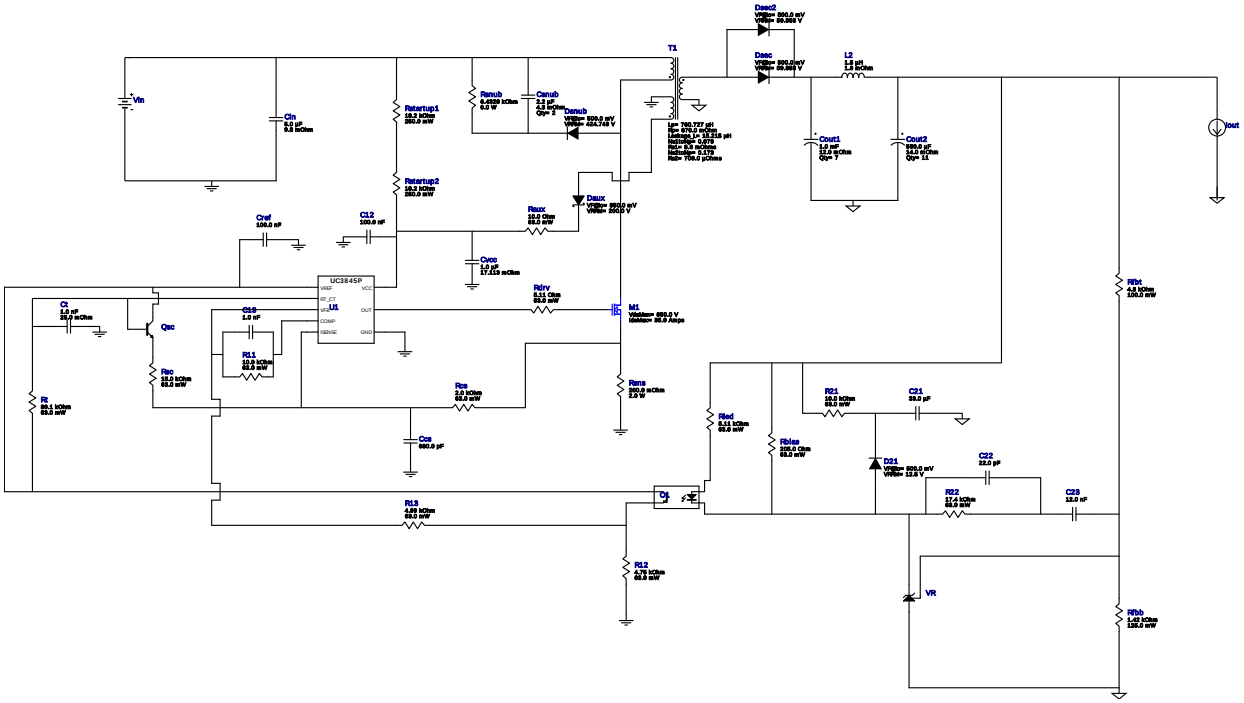
WEBENCH® Design Report

VinMin = 110.0V
VinMax = 240.0V
Vout = 5.0V
Iout = 20.0A

Device = UC3845N
Topology = Flyback
Created = 8/25/16 4:27:27 PM
BOM Cost = $0.00
BOM Count = 60
Total Pd = 0.0W

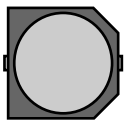
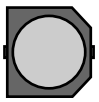
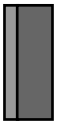
Design : 3473280/72 UC3845N
UC3845N 110.0V-240.0V to 5.00V @ 20.0A



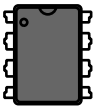
My Comments
5v

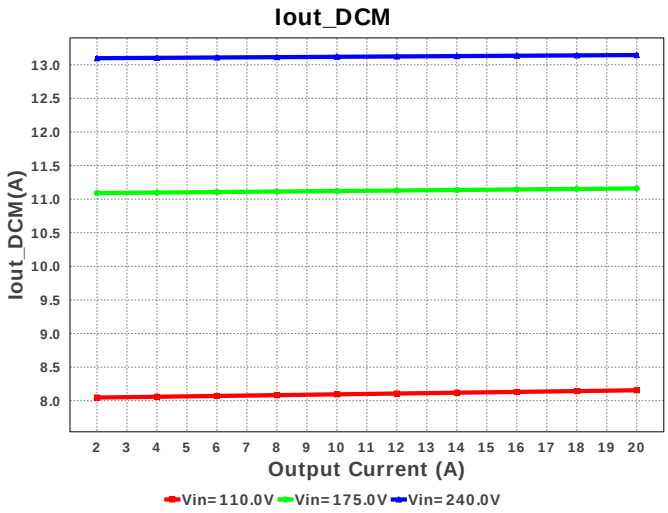
Electrical BOM

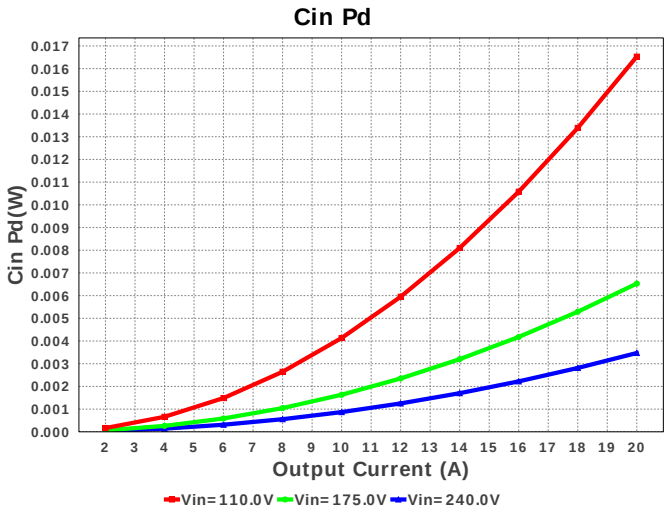
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C12	MuRata	GRM155R61C104KA88D Series= X5R	Cap= 100.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
2.	C13	MuRata	GRM033R71C102KA01D Series= X7R	Cap= 1.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2
3.	C21	MuRata	KCM55WR7YA336MH01K Series= X7R	Cap= 33.0 uF VDC= 35.0 V IRMS= 0.0 A	1	$1.51	KCM55W 59 mm^2
4.	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
5.	C23	MuRata	GRM033C80J123KE01D Series= X6S	Cap= 12.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2
6.	Ccs	MuRata	GRM033R71C681KA01D Series= X7R	Cap= 680.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2

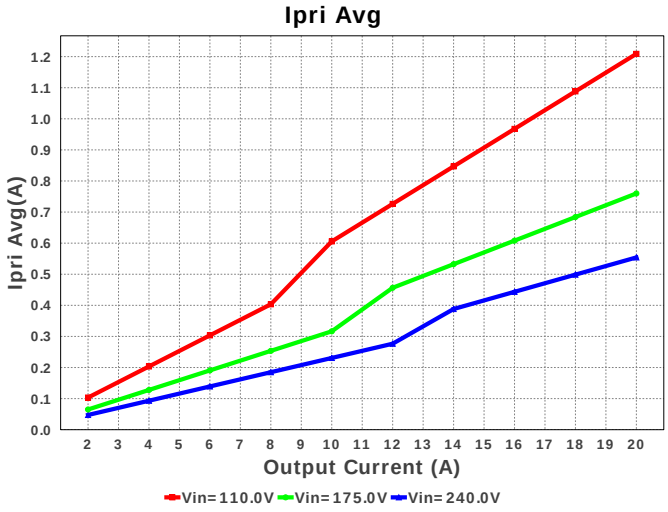
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	Cin	TDK	B32774D1505K Series= B32774	Cap= 5.0 uF ESR= 9.8 mOhm VDC= 1.3 kV IRMS= 10.5 A	1	$3.08	 B32774_3150x2200x3650 804 mm^2
8.	Cout1	Panasonic	16SVPF1000M Series= ?	Cap= 1.0 mF ESR= 12.0 mOhm VDC= 16.0 V IRMS= 5.4 A	7	$0.74	 CAPSMT_62_F12 151 mm^2
9.	Cout2	Panasonic	16SVPF560M Series= ?	Cap= 560.0 uF ESR= 14.0 mOhm VDC= 16.0 V IRMS= 4.95 A	11	$0.61	 CAPSMT_62_E12 106 mm^2
10.	Cref	MuRata	GRM155R61C104KA88D Series= X5R	Cap= 100.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	 0402 3 mm^2
11.	Csnub	TDK	C5750X6S2W225K Series= X6S	Cap= 2.2 uF ESR= 4.3 mOhm VDC= 400.0 V IRMS= 0.0 A	2	NA	 2220 54 mm^2
12.	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
13.	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
14.	D21	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 12.5 V	1	NA	CUSTOM 0 mm^2
15.	Daux	Diodes Inc.	DFLS1200-7	VF@Io= 850.0 mV VRRM= 200.0 V	1	$0.21	 PowerDI123 13 mm^2
16.	Dsec	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 59.888 V	1	NA	CUSTOM 0 mm^2
17.	Dsec2	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 59.888 V	1	NA	CUSTOM 0 mm^2
18.	Dsnub	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 424.743 V	1	NA	CUSTOM 0 mm^2
19.	L2	Coilcraft	XAL1010-152MEB	L= 1.5 µH DCR= 1.6 mOhm	1	$1.71	 XAL1010 160 mm^2
20.	M1	STMicroelectronics	STP45N65M5	VdsMax= 650.0 V IdsMax= 35.0 Amps	1	$3.85	 TO-220AB 397 mm^2
21.	O1	Vishay-Semiconductor	TCMT1109	Optocoupler	1	$0.21	 SOP-4 44 mm^2

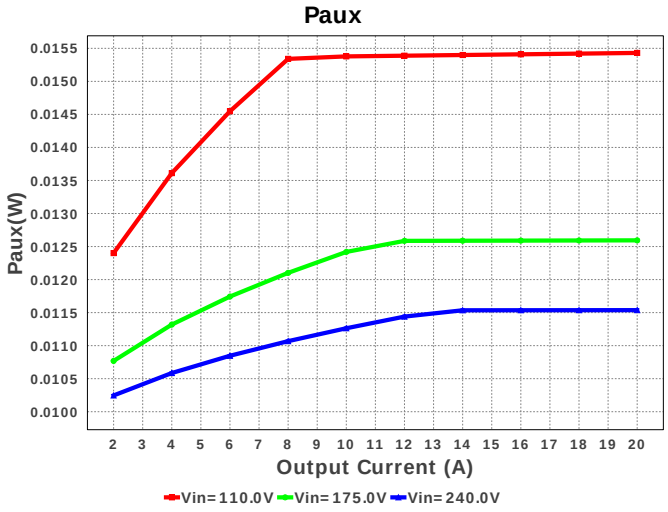
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
22.	Qsc	STMicroelectronics	2N2222A	Bipolar Transistor	1	NA	 TO-18 57 mm²
23.	R11	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
24.	R12	Vishay-Dale	CRCW04024K75FKED Series= CRCW..e3	Res= 4.75 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
25.	R13	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
26.	R21	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
27.	R22	Vishay-Dale	CRCW040217K4FKED Series= CRCW..e3	Res= 17.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
28.	Raux	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
29.	Rbias	Vishay-Dale	CRCW0402205RFKED Series= CRCW..e3	Res= 205.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
30.	Rcs	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
31.	Rdrv	Vishay-Dale	CRCW04025R11FKED Series= CRCW..e3	Res= 5.11 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
32.	Rfbb	Yageo America	RT0805BRD071K42L Series= RT0805	Res= 1.42 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.05	0805 7 mm²
33.	Rfbt	Yageo America	RC0603FR-074K3L Series= ?	Res= 4.3 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
34.	Rled	Vishay-Dale	CRCW04025K11FKED Series= CRCW..e3	Res= 5.11 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
35.	Rsc	Vishay-Dale	CRCW040215K0FKED Series= CRCW..e3	Res= 15.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
36.	Rsns	Stackpole Electronics Inc	CSRN2512FKR200 Series= ?	Res= 200.0 mOhm Power= 2.0 W Tolerance= 1.0%	1	$0.13	 2512 43 mm²
37.	Rsnub	CUSTOM	CUSTOM Series= ?	Res= 6.4328 kOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
38.	Rstartup1	Panasonic	ERJ-8ENF1822V Series= ERJ-8E	Res= 18.2 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	 1206 11 mm²
39.	Rstartup2	Panasonic	ERJ-8ENF1822V Series= ERJ-8E	Res= 18.2 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	 1206 11 mm²
40.	Rt	Vishay-Dale	CRCW040230K1FKED Series= CRCW..e3	Res= 30.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

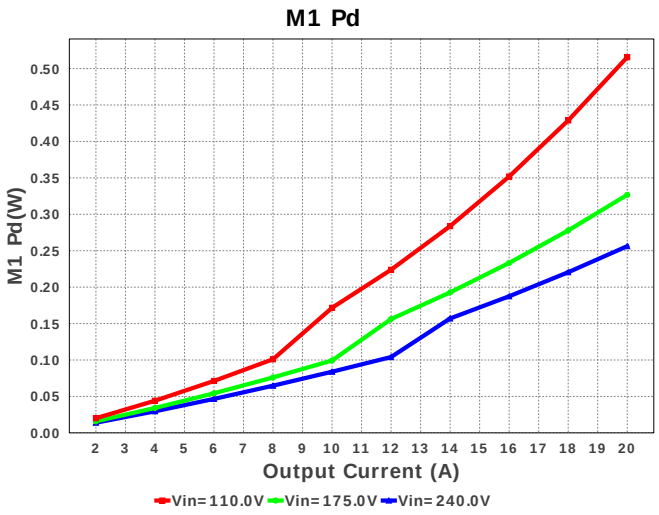
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
41.	T1	CUSTOM	CUSTOM	Lp= 760.727 µH Rp= 870.0 mOhm Leakage_L= 15.215 µH Ns1toNp= 0.079 Rs1= 8.6 mOhms Ns2toNp= 0.173 Rs2= 700.0 µOhms	1	NA	CUSTOM 0 mm^2
42.	U1	Texas Instruments	UC3845N	Switcher	1	$0.56	 P0008A 116 mm^2
43.	VR	Texas Instruments	LMV431CM5/NOPB	Voltage References	1	$0.16	 R-PDSO-G3 16 mm^2

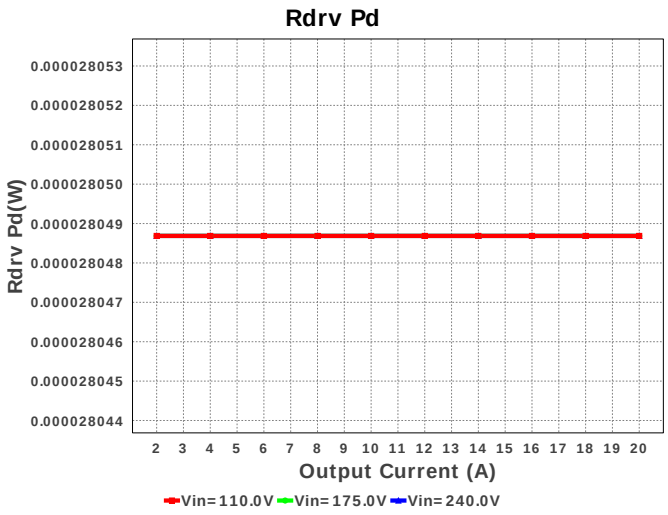


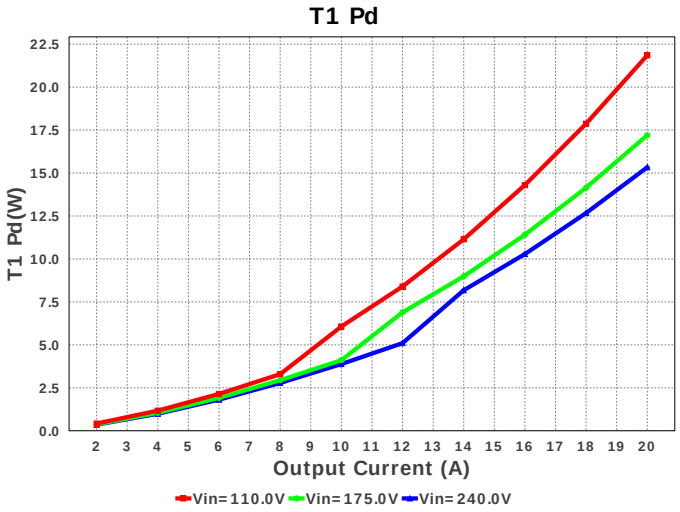


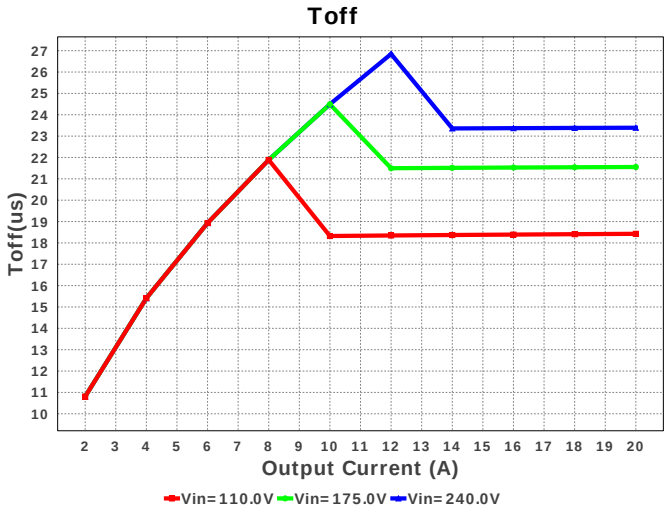


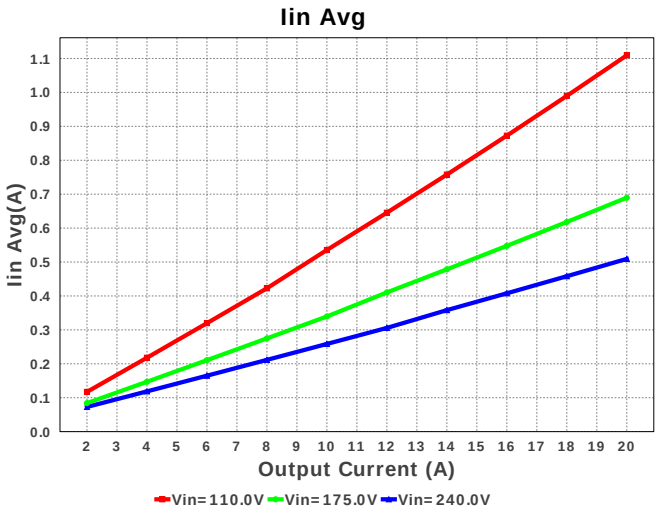


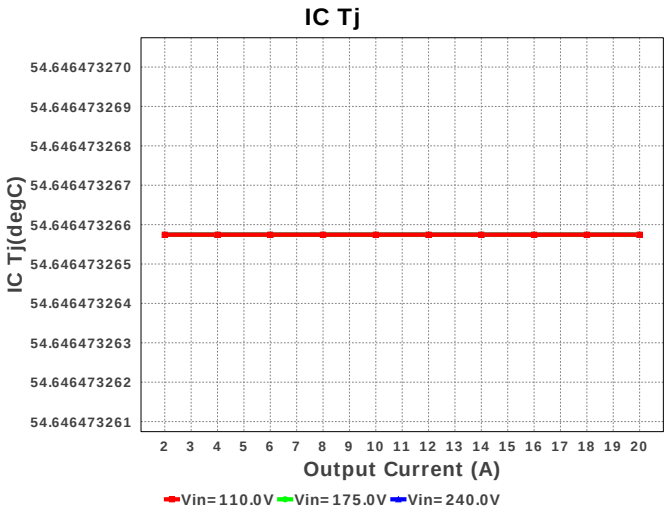


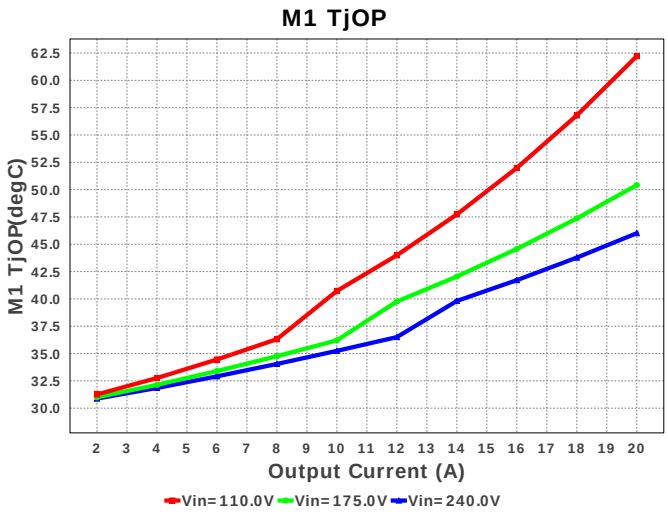


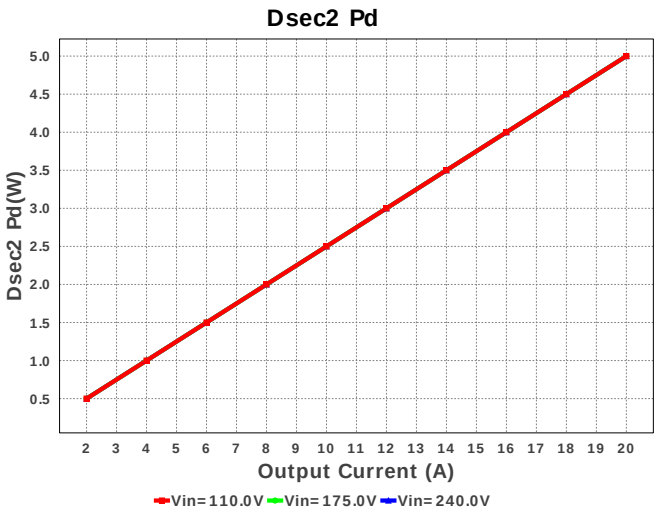


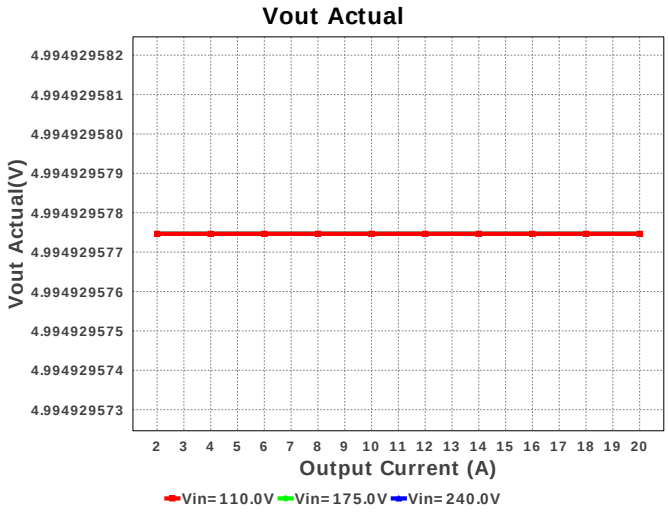


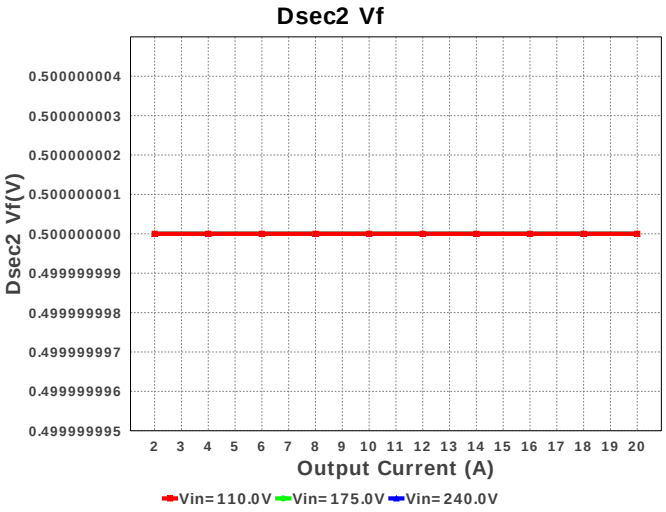


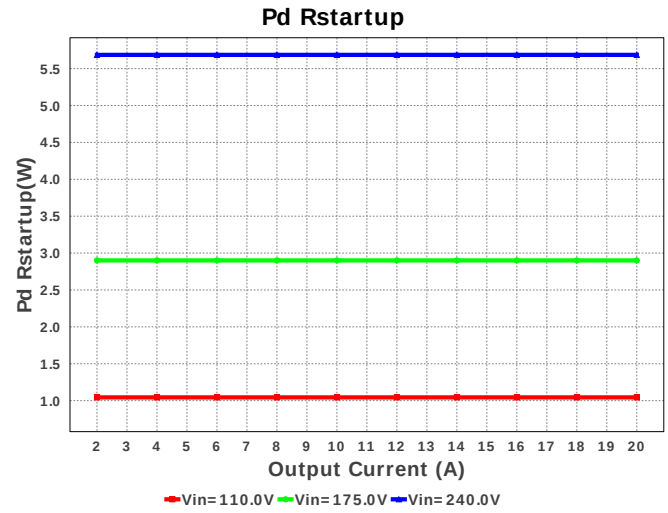


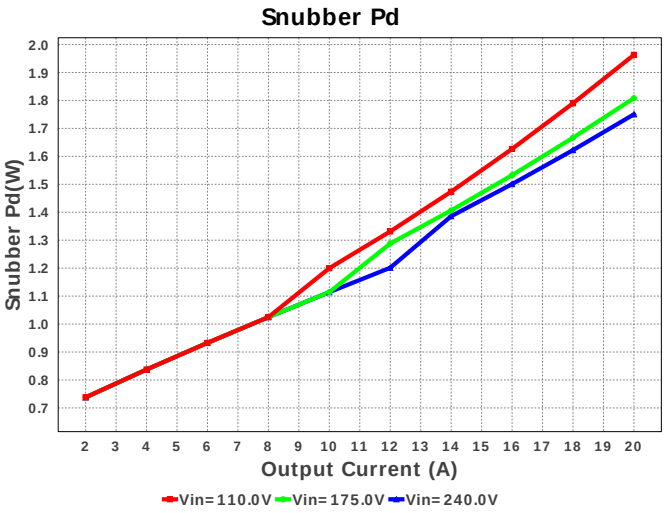


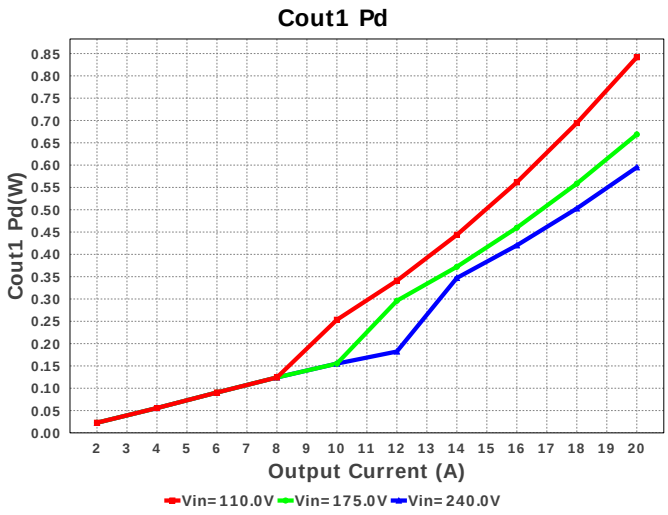


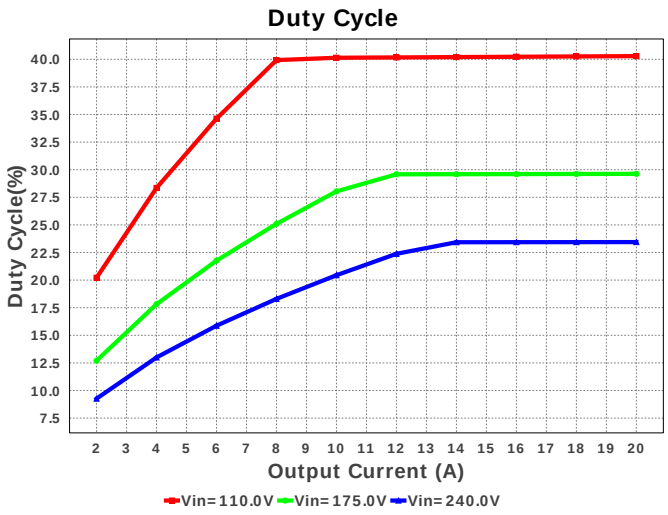


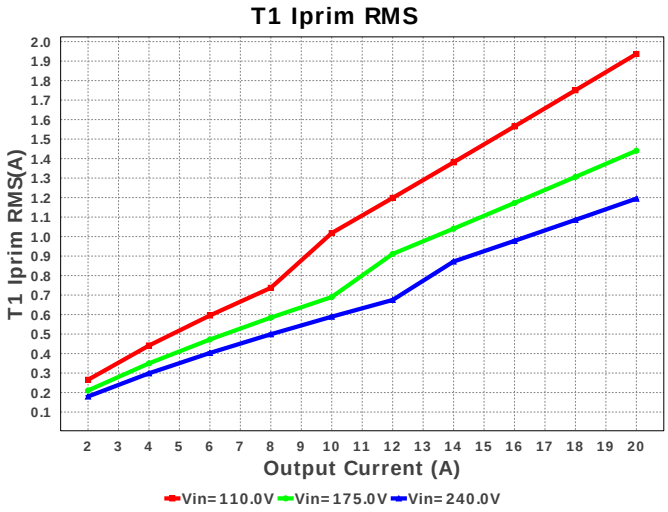


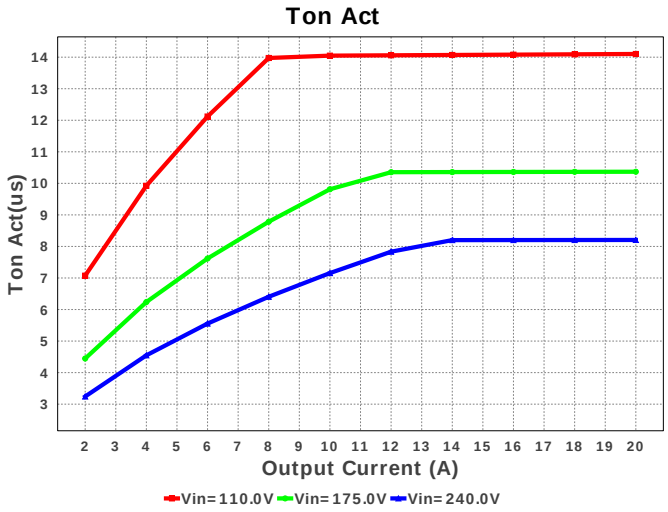


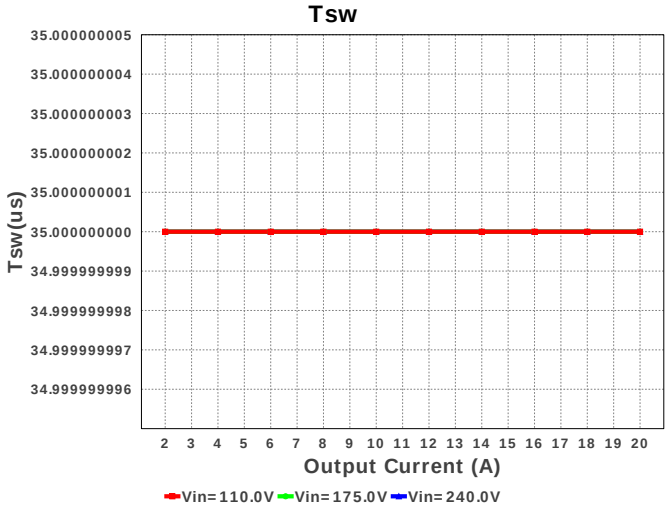


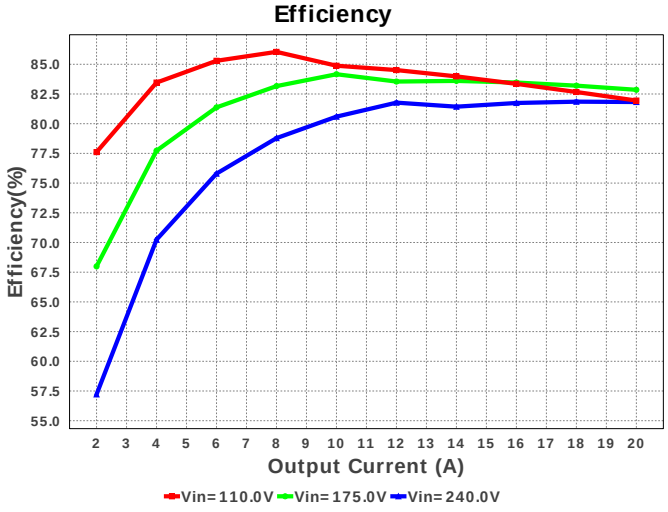


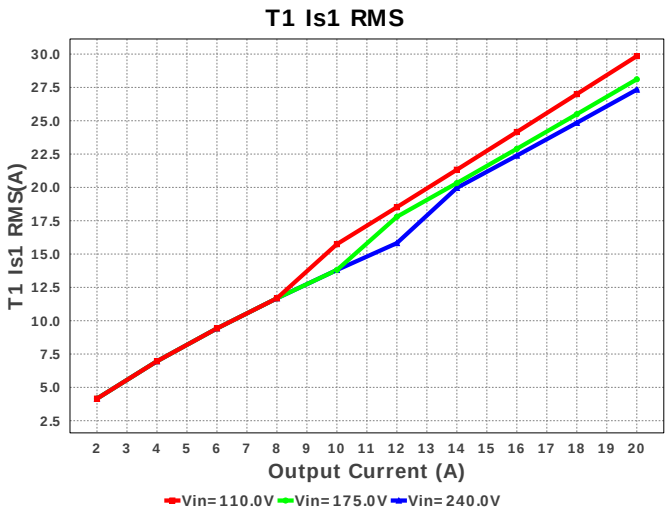


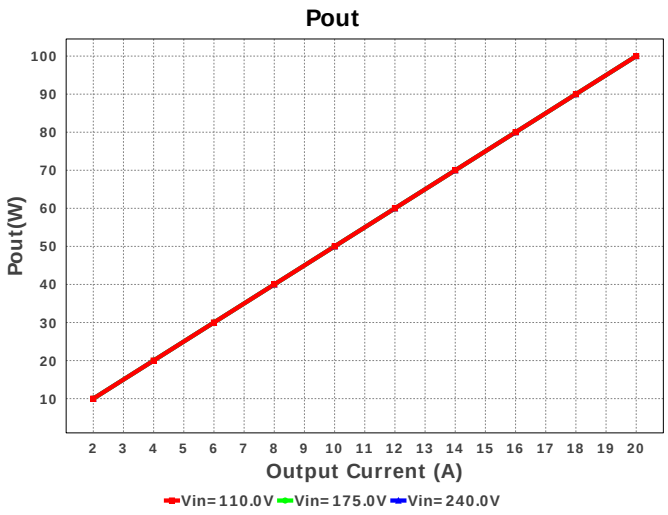


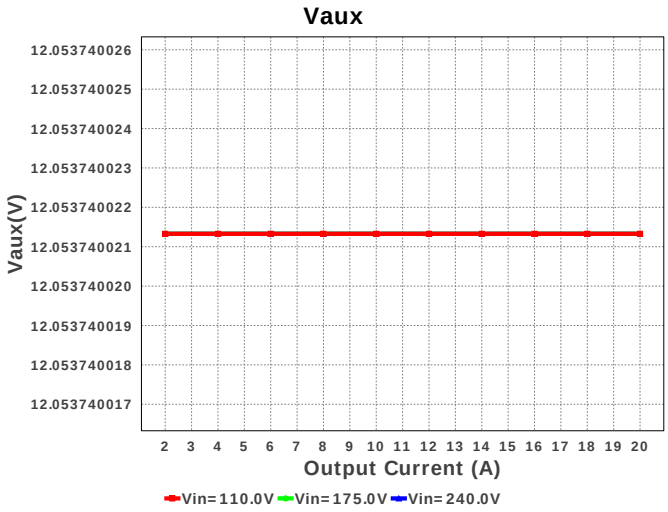


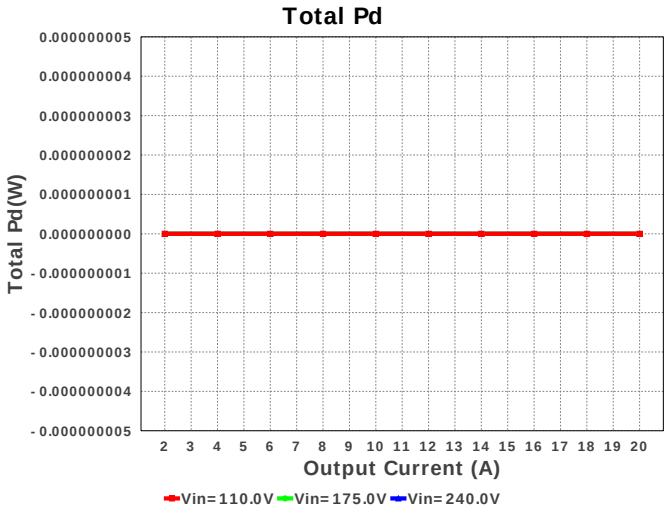


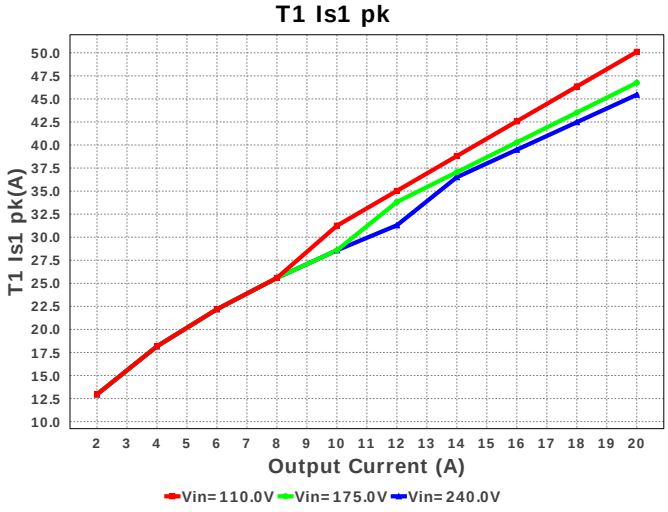


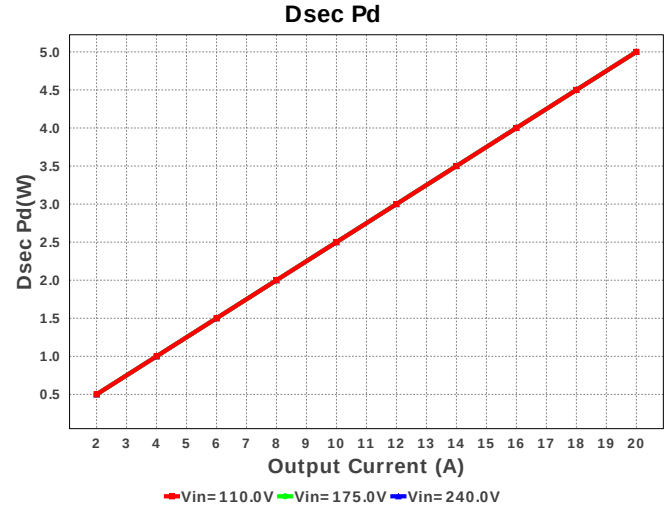


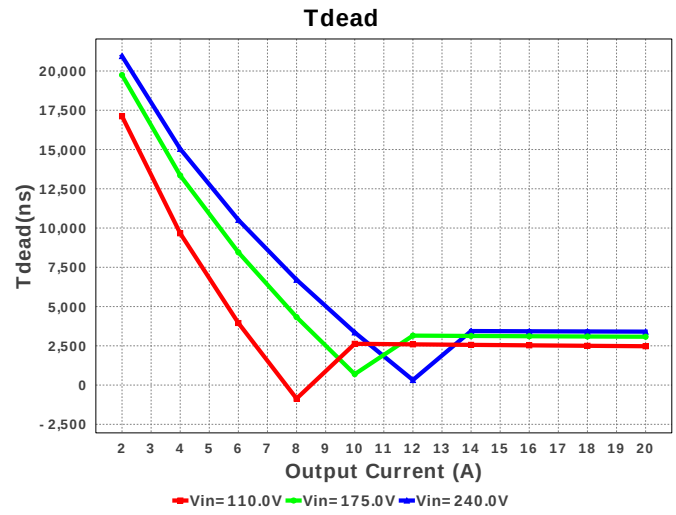


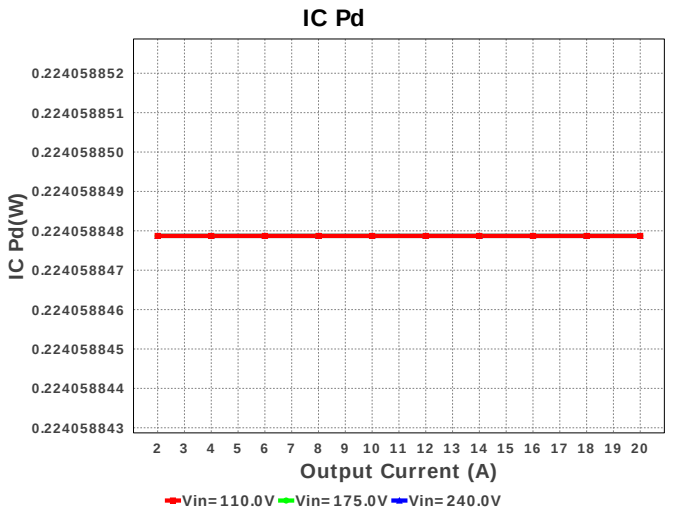


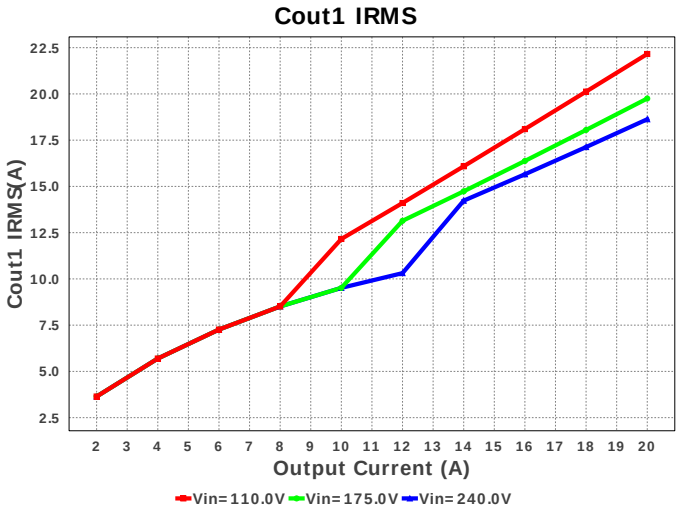


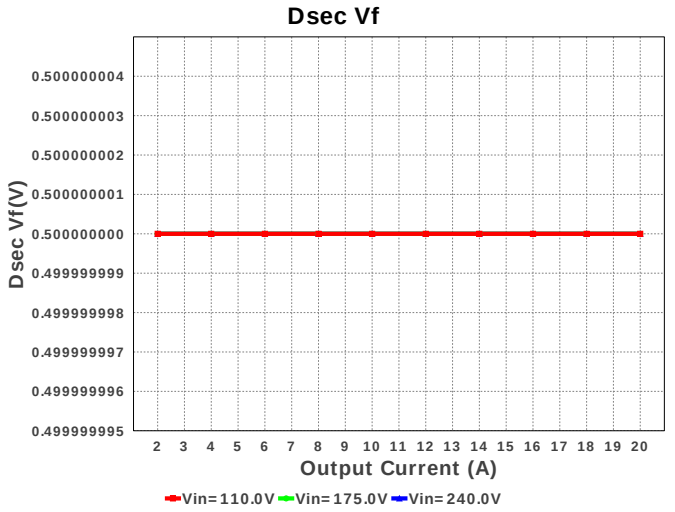


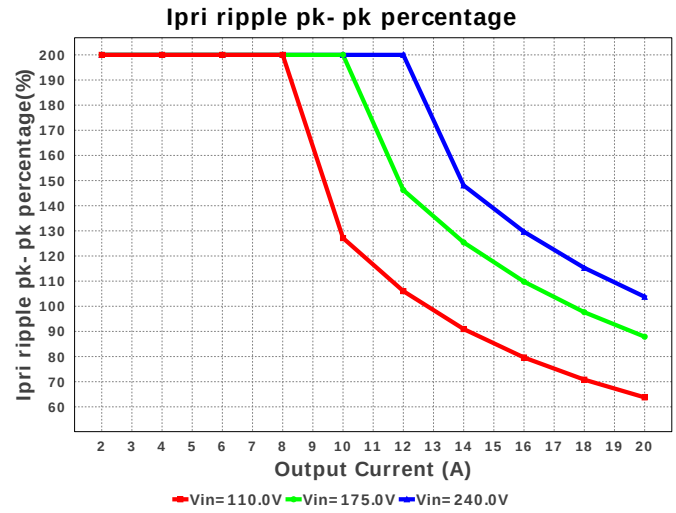


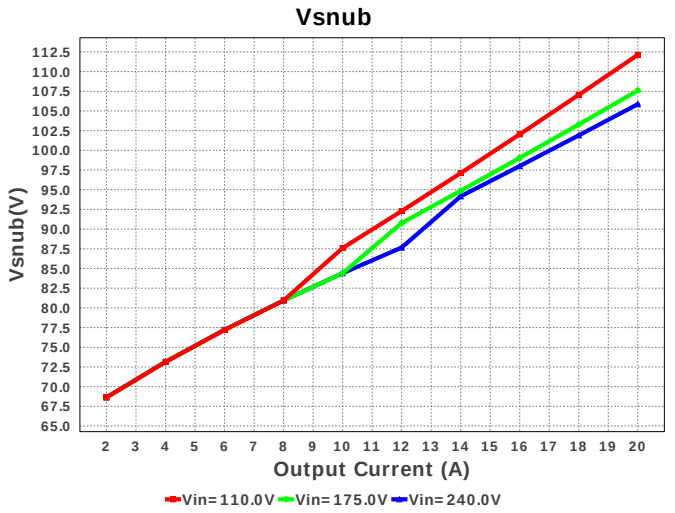


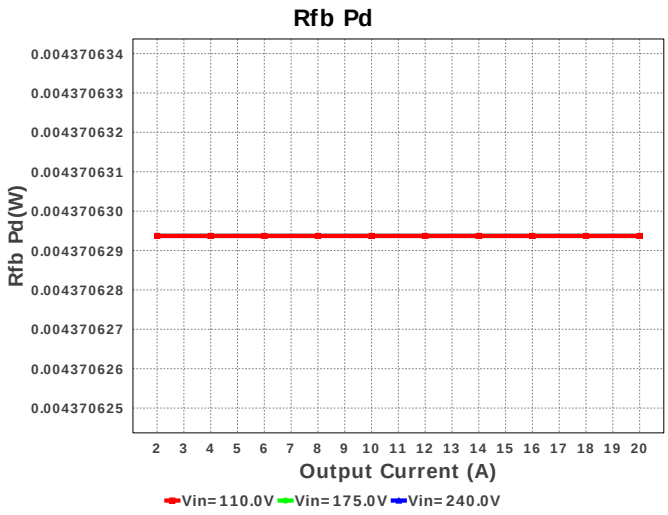


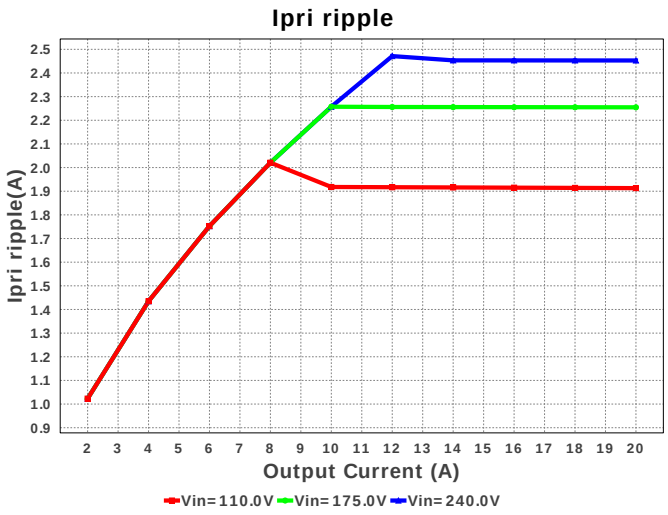


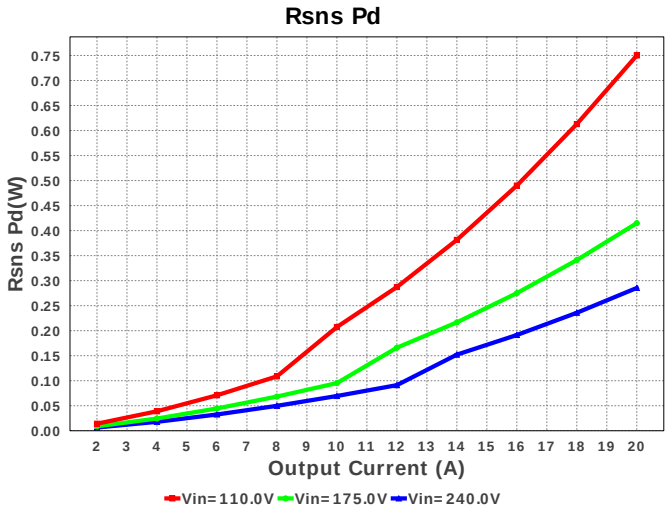


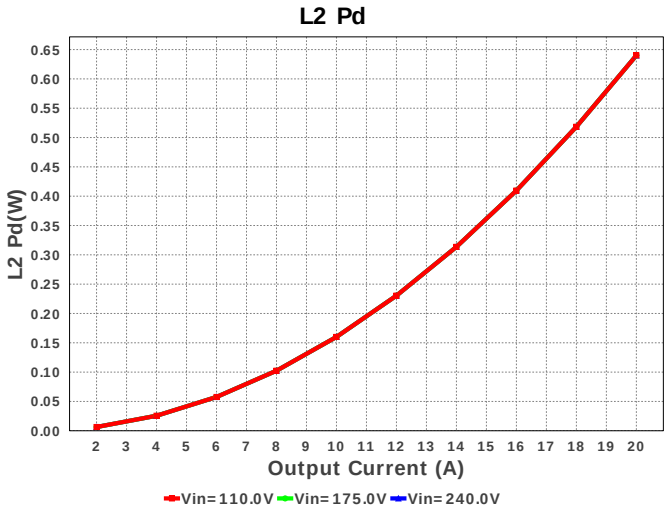


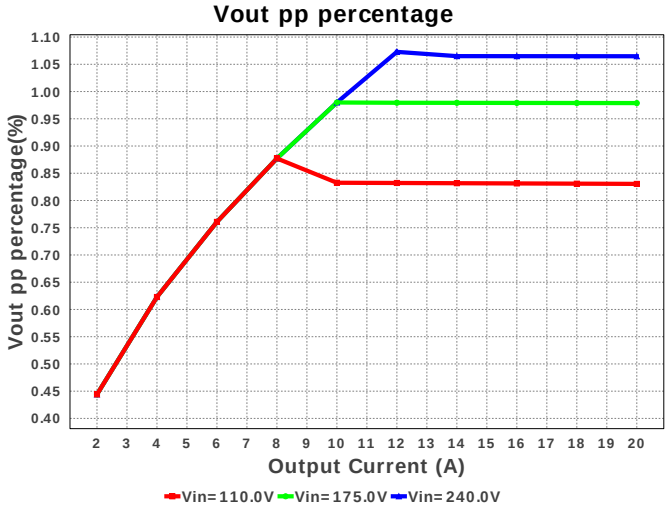


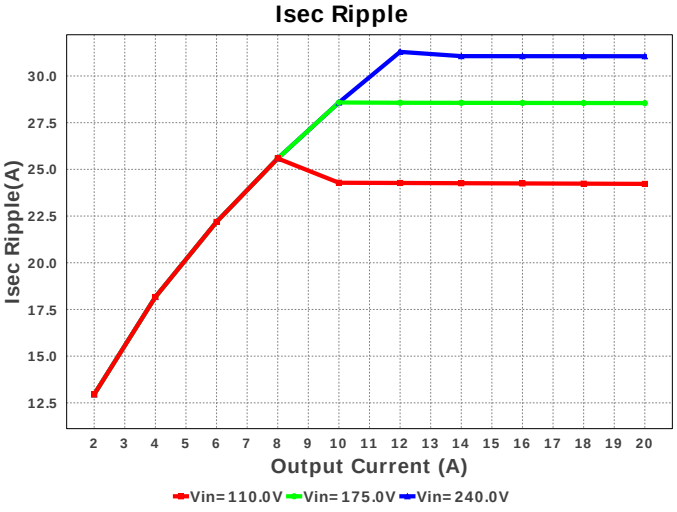


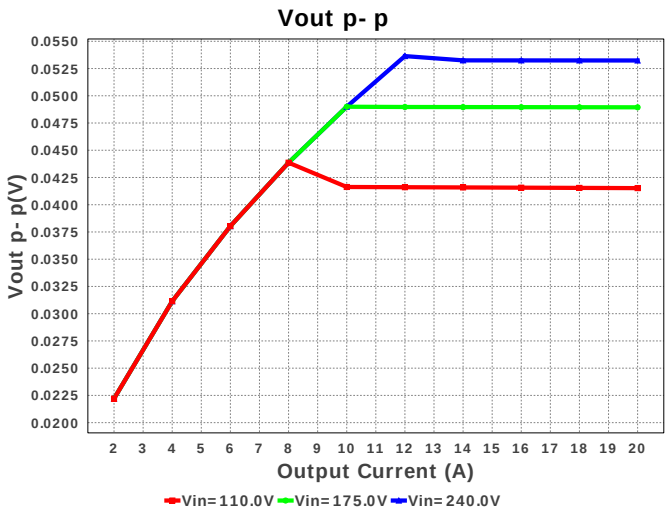


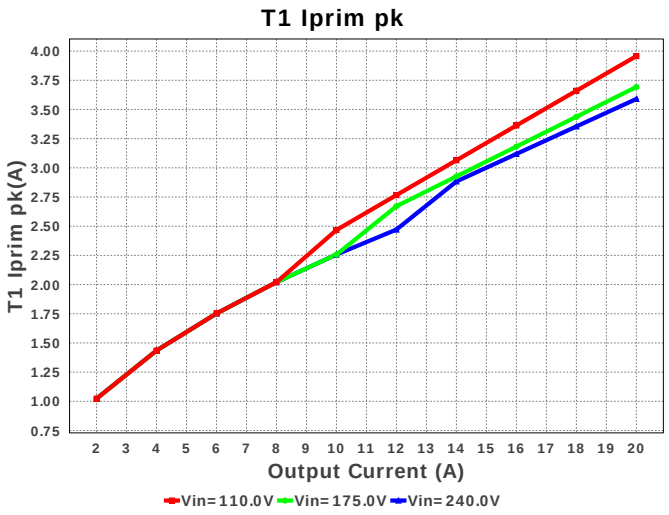












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	22.158 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	1.109 A	Current	Average input current
3.	Iout_DCM	8.155 A	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	1.209 A	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	1.913 A	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	63.759 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	24.222 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	1.937 A	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	3.957 A	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	29.849 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	50.102 A	Current	Transformer Secondary1 Peak Current
12.	BOM Count	60	General	Total Design BOM count
13.	Daux trr	0.0 ns	General	Auxiliary Diode Reverse Recovery Time
14.	Dsec Vf	500.0 mV	General	Effective Forward Voltage Drop at the Operating Current
15.	Dsec trr	0.0 ns	General	Output Diode Reverse Recovery Time
16.	Dsec2 Vf	500.0 mV	General	Effective Forward Voltage Drop at the Operating Current
17.	Dsnub trr	0.0 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	4.262 k mm^2	General	Total Foot Print Area of BOM components
19.	Frequency	28.571 kHz	General	Switching frequency
20.	Mode	CCM	General	Conduction Mode
21.	Pout	100.0 W	General	Total output power
22.	Tdead	2.473 kns	General	Approximate Dead Time of the Regulator
23.	Toff	18.426 us	General	Approximate Converter Off Time
24.	Ton Act	14.101 us	General	Approximate Converter On Time
25.	Total BOM	$0.0	General	Total BOM Cost
26.	Tsw	35.0 us	General	Switching Time Period
27.	Vaux	12.054 V	General	Auxiliary Voltage
28.	Vsnub	112.122 V	General	Voltage Across the Snubber
29.	Vout Actual	4.995 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
30.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
31.	Duty Cycle	40.289 %	Op_point	Duty cycle
32.	Efficiency	81.948 %	Op_point	Steady state efficiency
33.	IC Tj	54.646 degC	Op_point	IC junction temperature
34.	ICThetaJA	110.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
35.	IOUT_OP	20.0 A	Op_point	Iout operating point
36.	M1 TjOP	62.219 degC	Op_point	M1 MOSFET junction temperature
37.	Vout p-p	41.524 mV	Op_point	Peak-to-peak output ripple voltage
38.	Cin Pd	16.529 mW	Power	Input capacitor power dissipation
39.	Cout1 Pd	841.701 mW	Power	Output capacitor1 power dissipation
40.	Dsec Pd	5.0 W	Power	Secondary Diode Power Dissipation
41.	Dsec2 Pd	5.0 W	Power	Secondary Diode Power Dissipation
42.	IC Pd	224.059 mW	Power	IC power dissipation
43.	L2 Pd	640.0 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
44.	M1 Pd	515.503 mW	Power	M1 MOSFET total power dissipation
45.	Paux	15.431 mW	Power	Power Dissipation in Raux and Daux
46.	Pd Rstartup	1.044 W	Power	Power Dissipation in Rstartup1 and Rstartup2
47.	Rdrv Pd	28.049 µW	Power	Power Dissipation in Gate Drive Resistor
48.	Rfb Pd	4.371 mW	Power	Rfb Power Dissipation
49.	Rsns Pd	750.031 mW	Power	Current Limit Sense Resistor Power Dissipation
50.	Snubber Pd	1.963 W	Power	Snubber Power Dissipation

#	Name	Value	Category	Description
51.	T1 Pd	21.85 W	Power	Estimated Losses in Transformer
52.	Total Pd	0.0 W	Power	Total Power Dissipation
53.	Vout Tolerance	1.478 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
54.	Vout pp percentage	830.479 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	20.0	Maximum Output Current
2.	VinMax	240.0	Maximum input voltage
3.	VinMin	110.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	UC3845	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

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