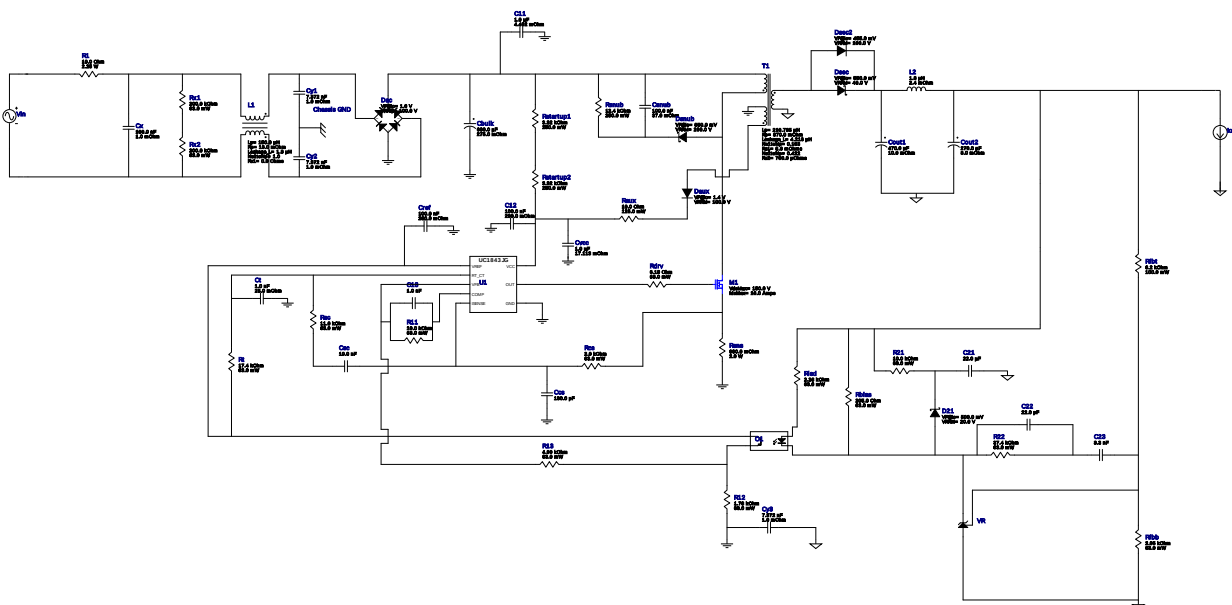


WEBENCH® Design Report

Design : 3893481/8 UC1843J
UC1843J 20.0V-30.0V to 5.00V @ 2.0A



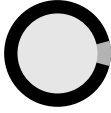
1. The EMI filter selected here contains the estimated values. The real numbers will depend on the attenuation needed at a particular frequency.

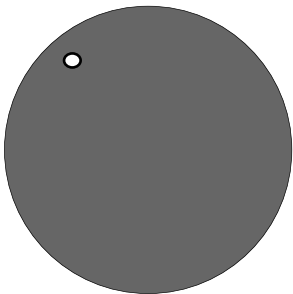
My Comments

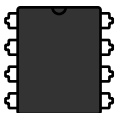
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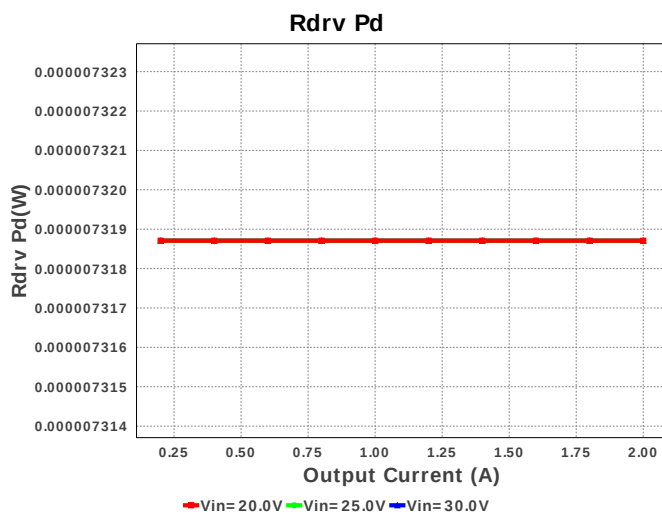
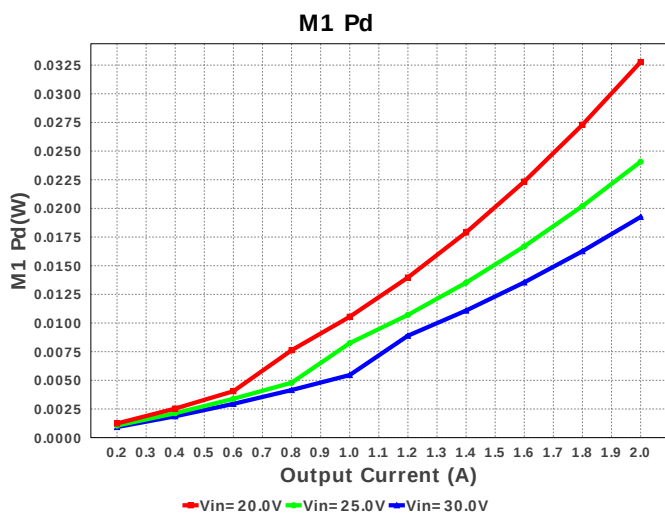
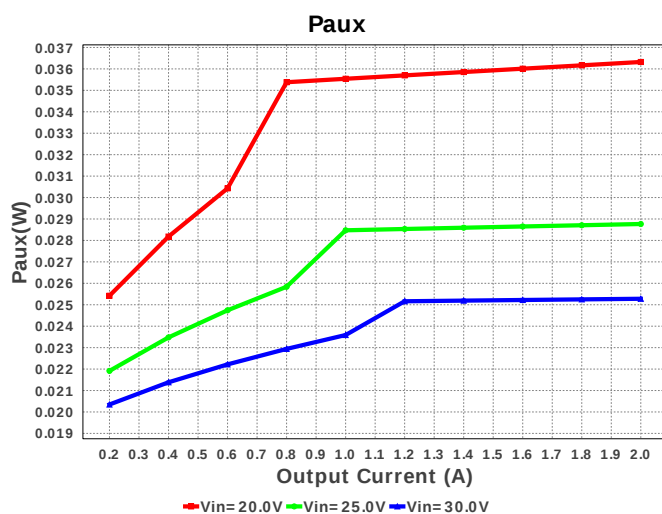
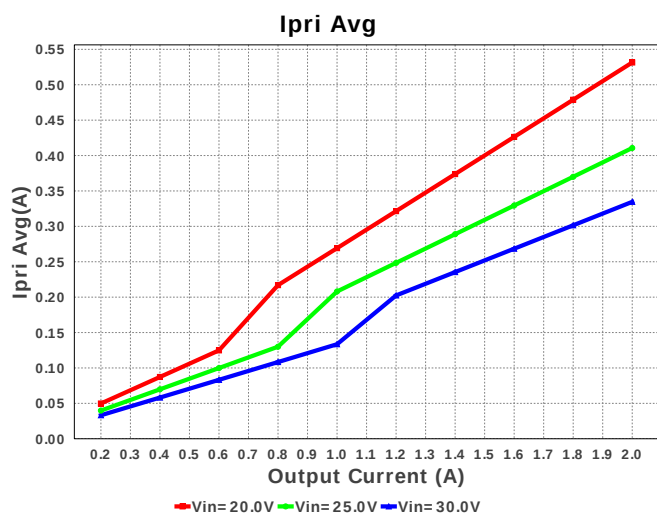
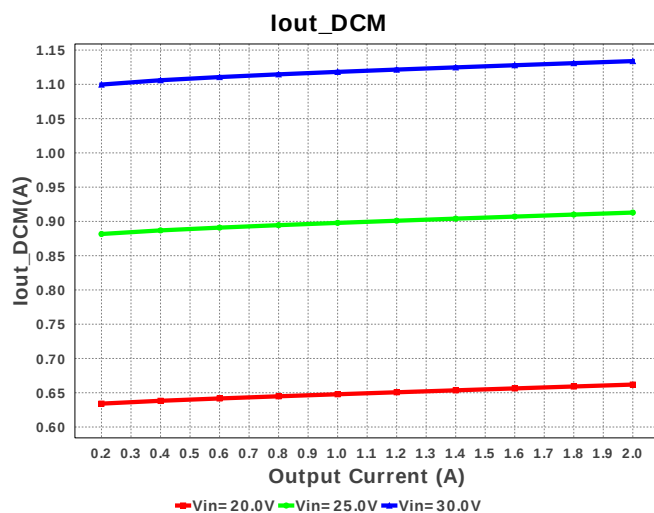
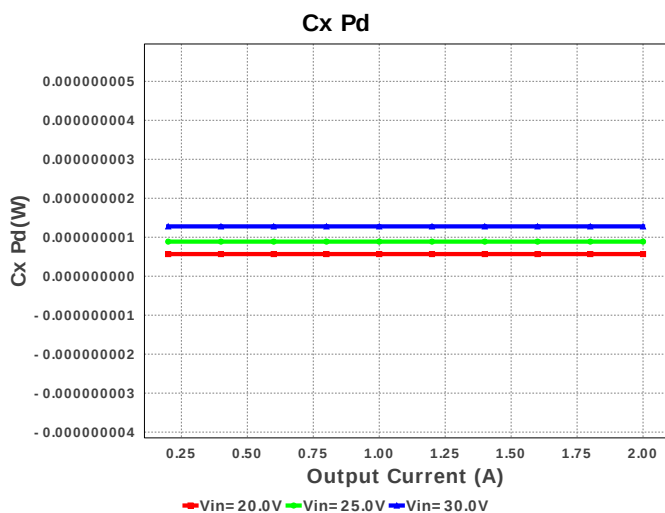
Electrical BOM

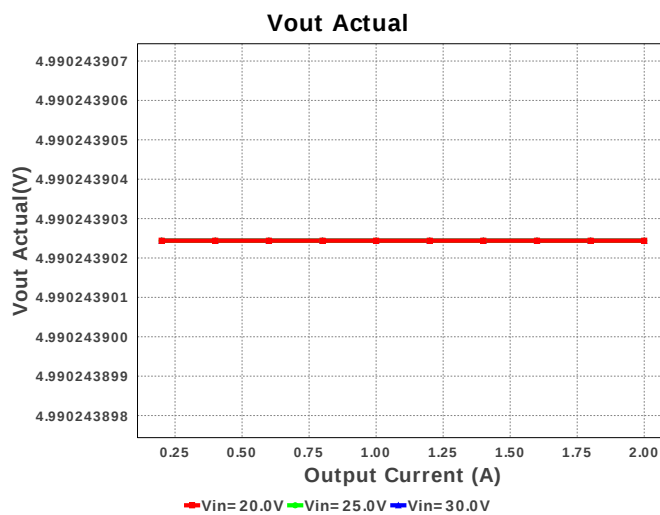
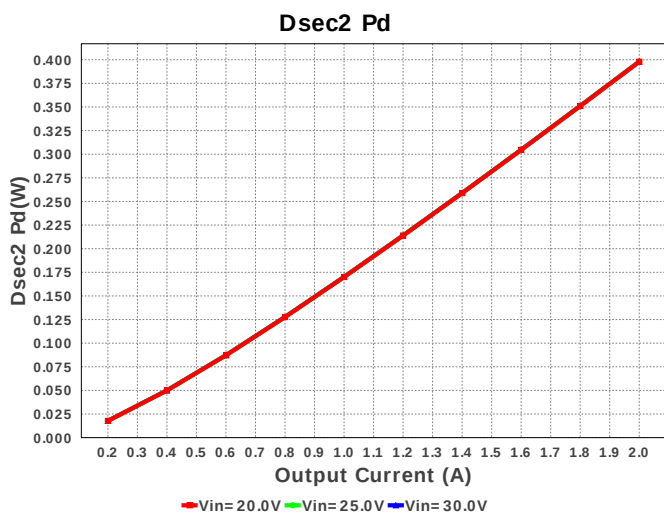
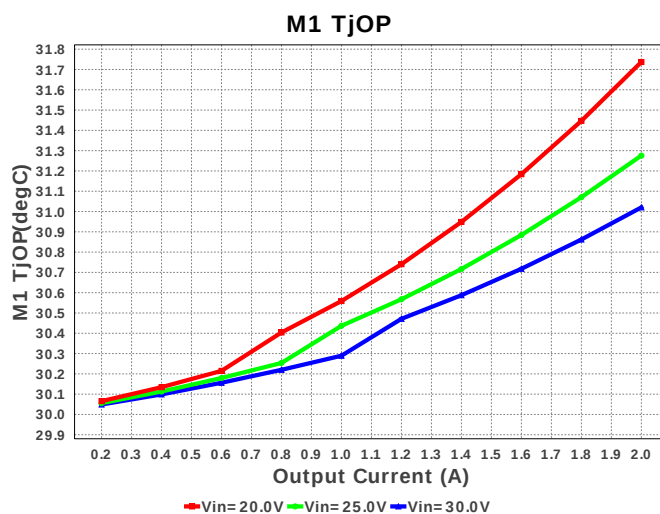
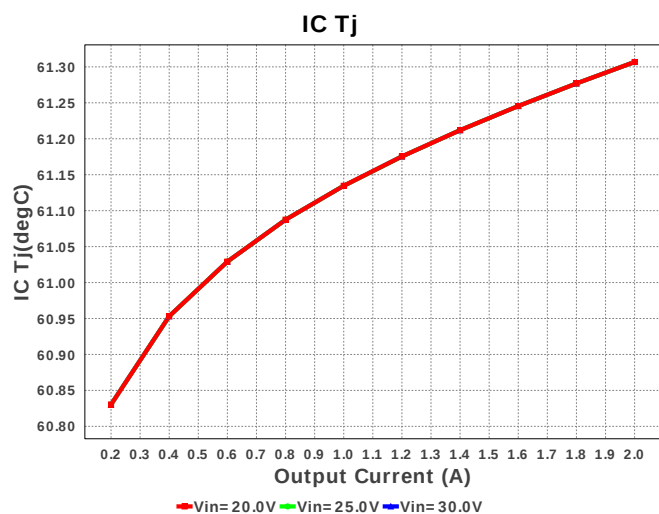
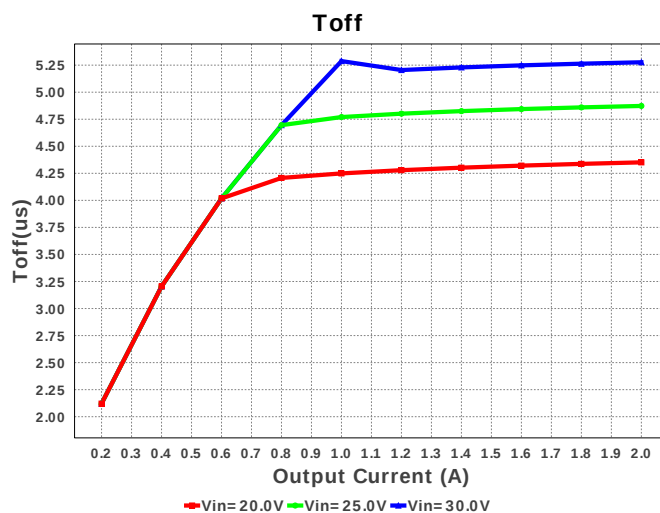
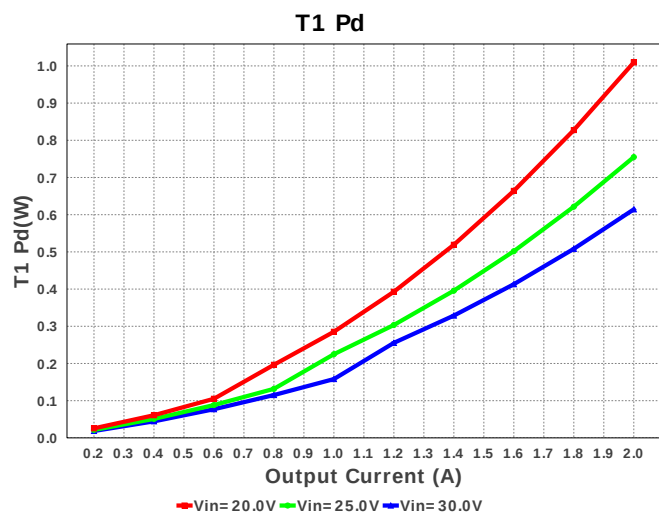
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1.	C11	MuRata	GRM21BR71H105KA12L Series= X7R	Cap= 1.0 uF ESR= 4.402 mOhm VDC= 50.0 V IRMS= 1.677 A	1	\$0.05	0805 7 mm ²
2.	C12	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	C13	Samsung 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	Taiyo Yuden	LMK212BJ226MG-T Series= X5R	Cap= 22.0 uF VDC= 10.0 V IRMS= 0.0 A	1	\$0.12	0805 7 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	MuRata	GRM216R71E332KA01D Series= X7R	Cap= 3.3 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
7.	Cbulk	Vishay-Bccomponents	MAL209619681E3 Series= 2356	Cap= 680.0 uF ESR= 275.0 mOhm VDC= 500.0 V IRMS= 4.1 A	1	\$23.87	096PLL-4TSL_3500x8000 1369 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

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cout1	Nichicon	RNU1C471MDN1PH Series= ?	Cap= 470.0 uF ESR= 10.0 mOhm VDC= 16.0 V IRMS= 6.1 A	1	\$0.52	 NU_1000x1250 144 mm ²
10.	Cout2	Panasonic	16SVPG270M Series= ?	Cap= 270.0 uF ESR= 8.0 mOhm VDC= 16.0 V IRMS= 5.8 A	1	\$0.70	 CAPSMT_62_C10 74 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	AVX	12061C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 37.0 mOhm VDC= 100.0 V IRMS= 0.0 A	1	\$0.03	 1206 11 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	CUSTOM	CUSTOM Series= ?	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 50.911 V IRMS= 5.6528 mA	1	NA	CUSTOM 0 mm ²
17.	Cy1	CUSTOM	CUSTOM Series= ?	Cap= 7.372 nF ESR= 1.0 mOhm VDC= 50.911 V IRMS= 500.0 uA	1	NA	CUSTOM 0 mm ²
18.	Cy2	CUSTOM	CUSTOM Series= ?	Cap= 7.372 nF ESR= 1.0 mOhm VDC= 50.911 V IRMS= 500.0 uA	1	NA	CUSTOM 0 mm ²
19.	Cy3	CUSTOM	CUSTOM Series= ?	Cap= 7.372 nF ESR= 1.0 mOhm VDC= 50.911 V IRMS= 500.0 uA	1	NA	CUSTOM 0 mm ²
20.	D21	Vishay-Semiconductor	SS12-E3/61T	VF@Io= 500.0 mV VRRM= 20.0 V	1	\$0.08	 SMA 37 mm ²
21.	Dac	Diodes Inc.	HD01-T	VF@Io= 1.0 V VRRM= 100.0 V	1	\$0.12	 MiniDIP 62 mm ²
22.	Daux	NXP Semiconductor	BAS316,115	VF@Io= 1.4 V VRRM= 100.0 V	1	\$0.02	 SOD-323 9 mm ²
23.	Dsec	Diodes Inc.	B540C-13-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.17	 SMC 83 mm ²
24.	Dsec2	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm ²

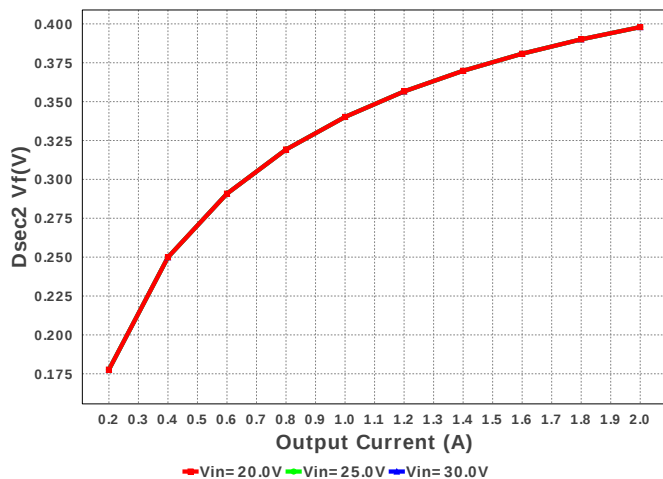
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
25.	Dsnub	Diodes Inc.	DFLS1200-7	VF@Io= 850.0 mV VRRM= 200.0 V	1	\$0.21	 PowerDI123 13 mm²
26.	L1	API Delevan	CM6296R-154	Lp= 150.0 µH Rp= 16.0 mOhm Leakage_L= 1.8 µH Ns1toNp= 1.0 Rs1= 0.0 Ohms	1	\$5.95	 CM6296 833 mm²
27.	L2	Coilcraft	SER1360-182KLB	L= 1.8 µH DCR= 2.4 mOhm	1	\$0.72	 SER1360 225 mm²
28.	M1	Fairchild Semiconductor	FDMC86240	VdsMax= 150.0 V IdsMax= 16.0 Amps	1	\$0.93	 TRANS_Fairchild_MLP08S 18 mm²
29.	O1	Vishay-Semiconductor	TCMT1109	Optocoupler	1	\$0.21	 SOP-4 44 mm²
30.	R1	Vishay-Dale	AC03000001009JACCS Series= F_RES	Res= 10.0 Ohm Power= 2.25 W Tolerance= 5.0%	1	\$0.30	 AC03 158 mm²
31.	R11	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
32.	R12	Vishay-Dale	CRCW04021K78FKED Series= CRCW..e3	Res= 1.78 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
33.	R13	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
34.	R21	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
35.	R22	Vishay-Dale	CRCW040237K4FKED Series= CRCW..e3	Res= 37.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
36.	Raux	Vishay-Dale	CRCW080510R0FKEA Series= CRCW..e3	Res= 10.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
37.	Rbias	Vishay-Dale	CRCW0402205RFBKED Series= CRCW..e3	Res= 205.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
38.	Rcs	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
39.	Rdrv	Vishay-Dale	CRCW04026R19FKED Series= CRCW..e3	Res= 6.19 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
40.	Rfbb	Vishay-Dale	CRCW04022K05FKED Series= CRCW..e3	Res= 2.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
41.	Rfbt	Yageo America	RC0603FR-076K2L Series= ?	Res= 6.2 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
42.	Rled	Vishay-Dale	CRCW04022K26FKED Series= CRCW..e3	Res= 2.26 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
43.	Rsc	Vishay-Dale	CRCW040211K0FKED Series= CRCW..e3	Res= 11.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
44.	Rsns	Stackpole Electronics Inc	CSRN2512FKR680 Series= ?	Res= 680.0 mOhm Power= 2.0 W Tolerance= 1.0%	1	\$0.09	 2512 43 mm²
45.	Rsnub	Panasonic	ERJ-8ENF1242V Series= ERJ-8E	Res= 12.4 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
46.	Rstartup1	Panasonic	ERJ-8ENF3321V Series= ERJ-8E	Res= 3.32 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
47.	Rstartup2	Panasonic	ERJ-8ENF3321V Series= ERJ-8E	Res= 3.32 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
48.	Rt	Vishay-Dale	CRCW040217K4FKED Series= CRCW..e3	Res= 17.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
49.	Rx1	Vishay-Dale	CRCW0402200KFKED Series= CRCW..e3	Res= 200.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
50.	Rx2	Vishay-Dale	CRCW0402200KFKED Series= CRCW..e3	Res= 200.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
51.	T1	CUSTOM	CUSTOM	Lp= 210.785 µH Rp= 870.0 mOhm Leakage_L= 4.216 µH Ns1toNp= 0.193 Rs1= 8.6 mOhms Ns2toNp= 0.422 Rs2= 700.0 µOhms	1	NA	CUSTOM 0 mm²
52.	U1	Texas Instruments	UC1843J	Switcher	1	\$9.45	 JG0008A 111 mm²
53.	VR	Texas Instruments	LMV431CM5/NOPB	Voltage References	1	\$0.16	 R-PDSO-G3 16 mm²

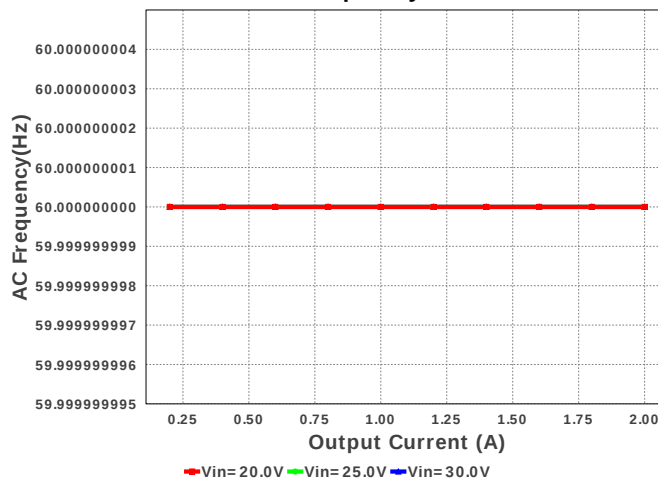




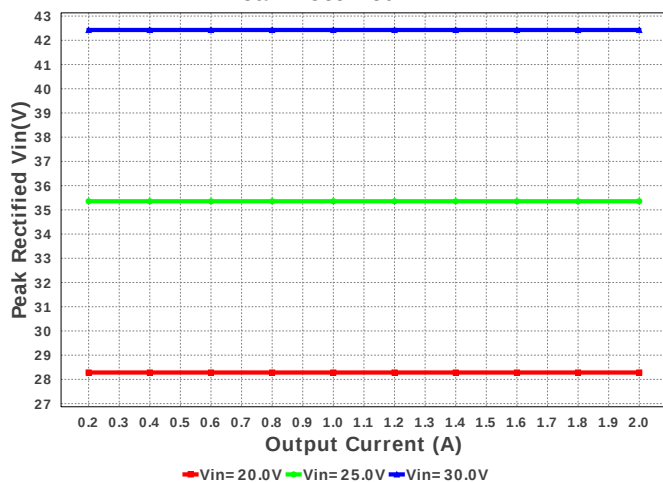
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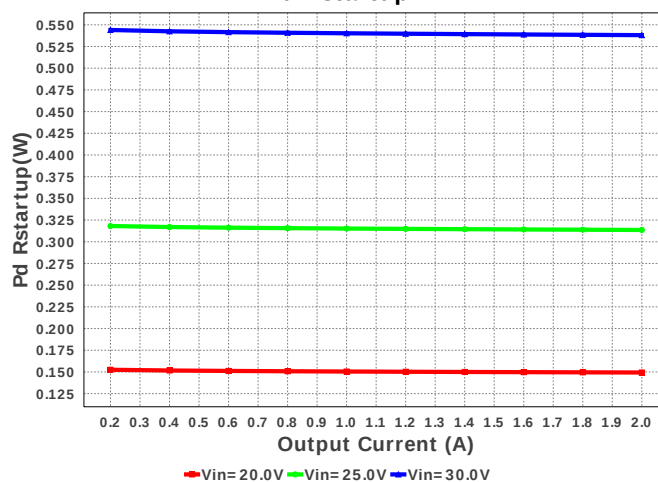
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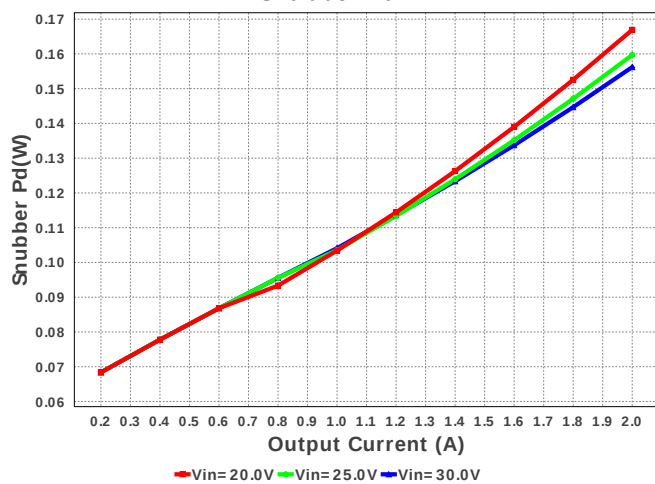
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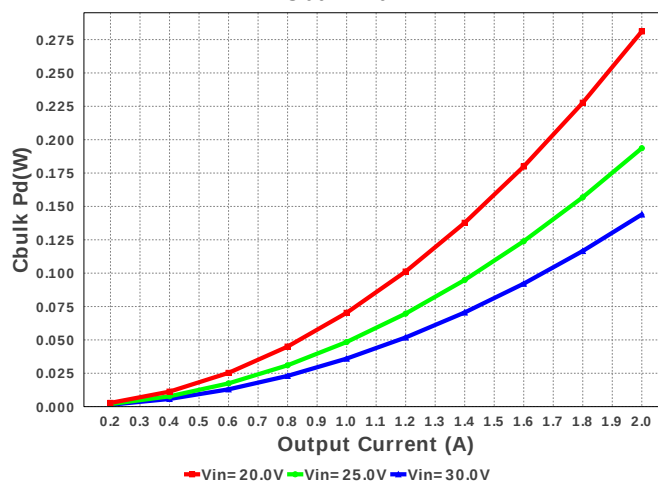
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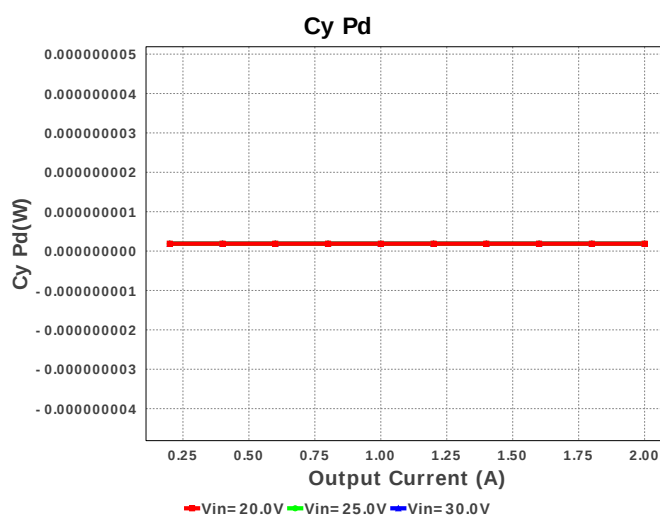
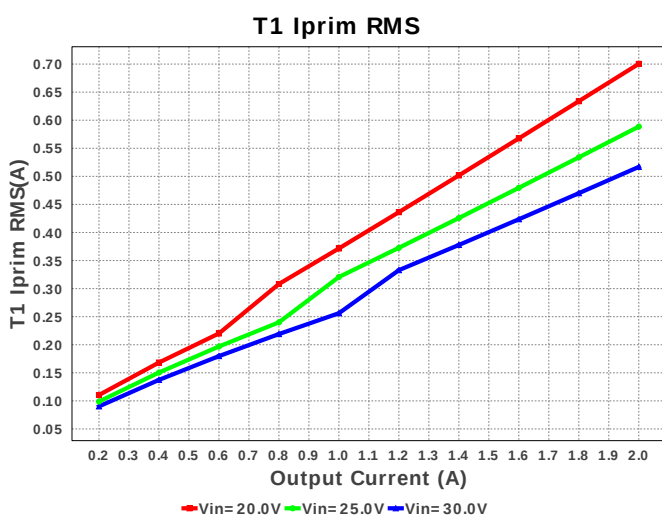
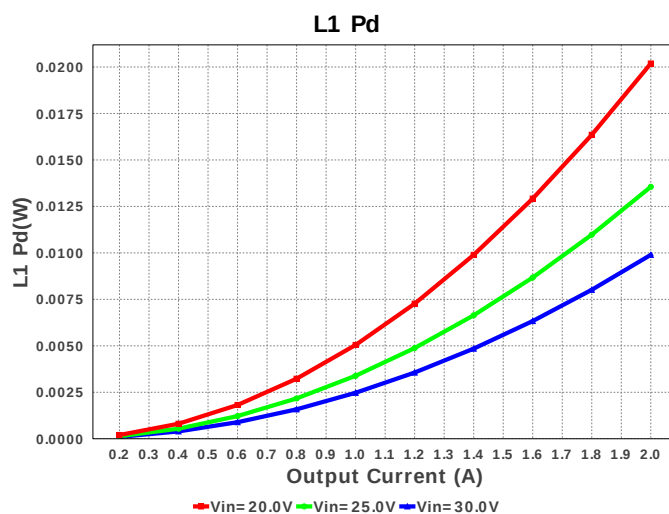
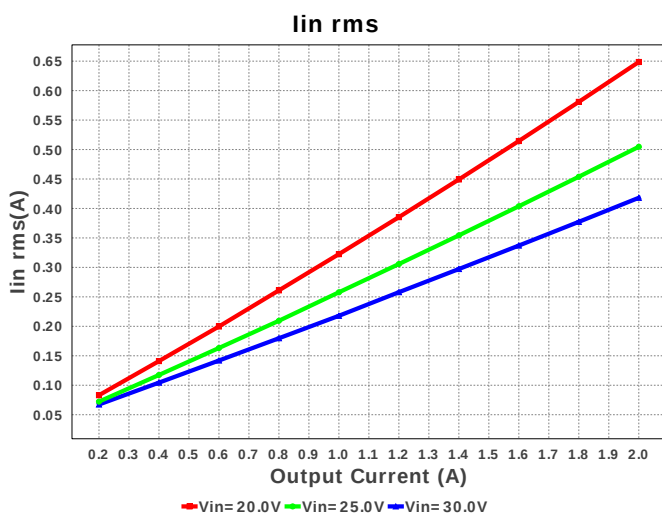
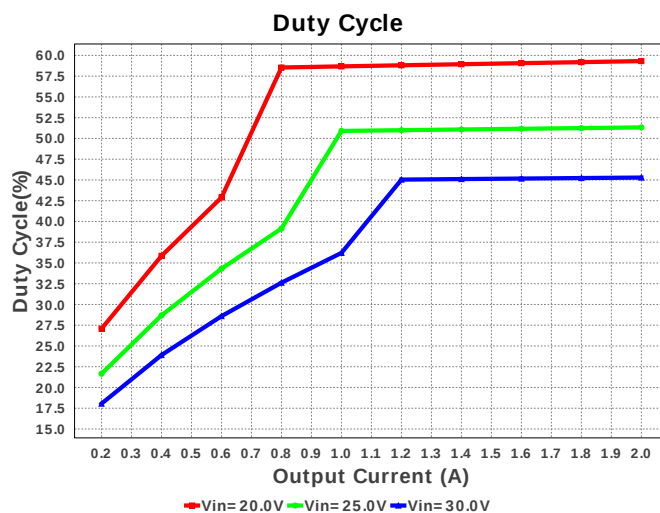
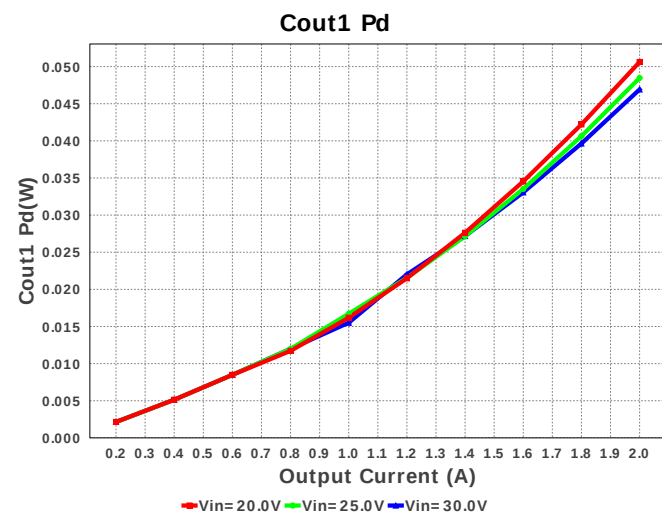


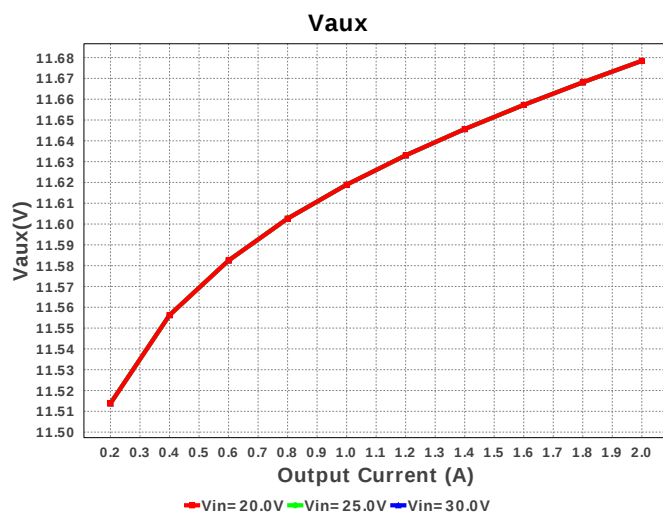
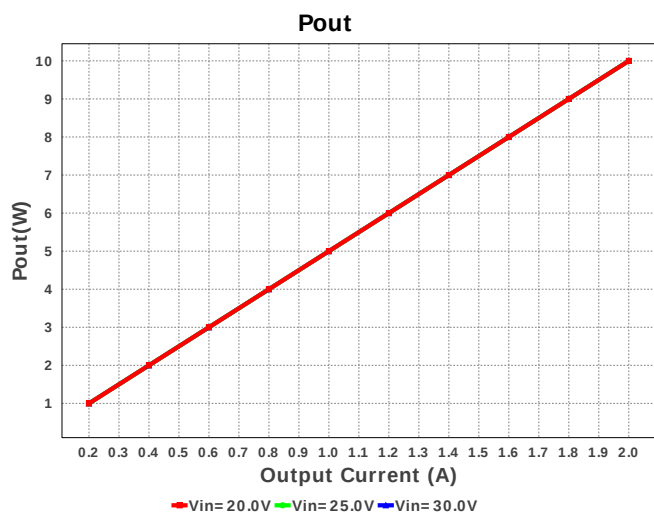
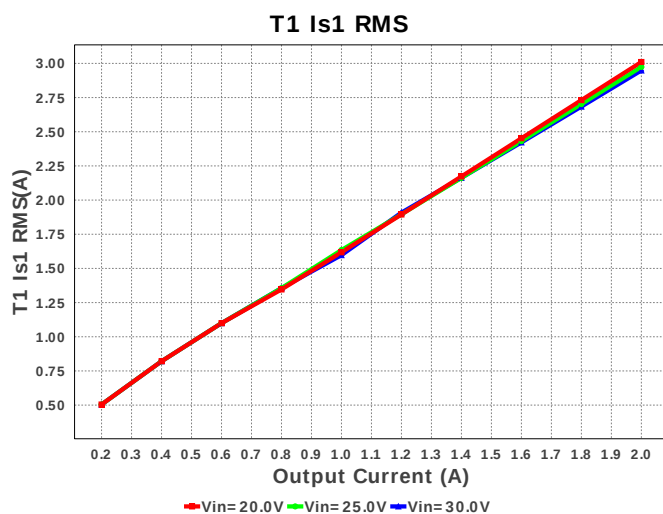
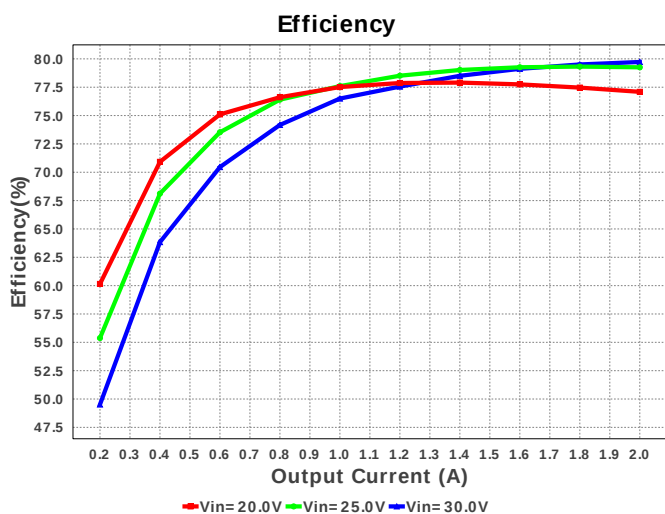
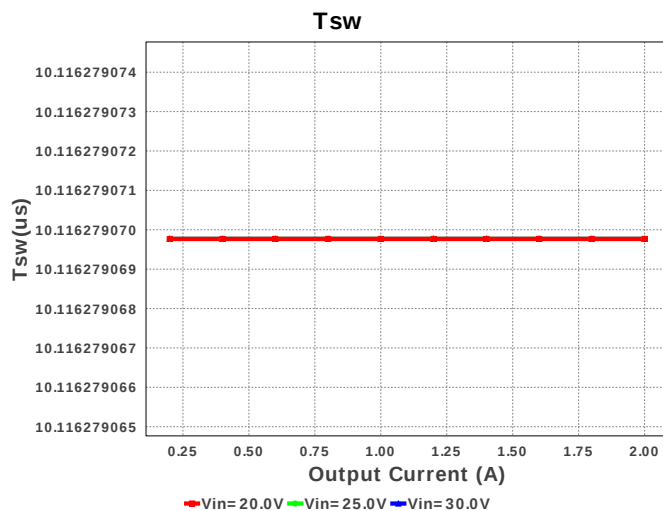
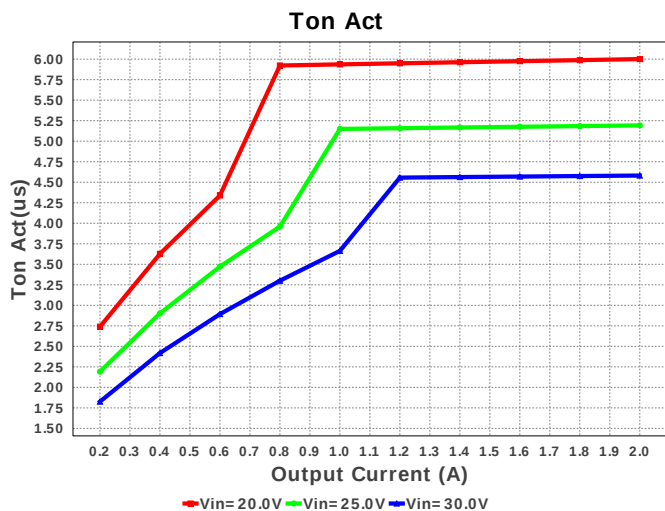
Snubber Pd

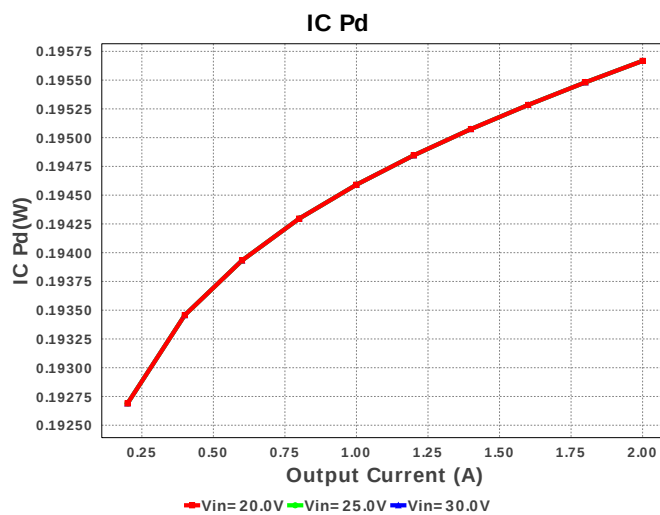
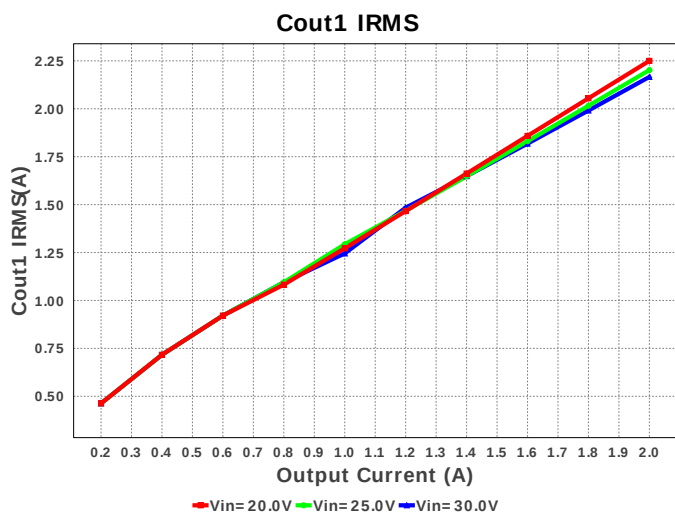
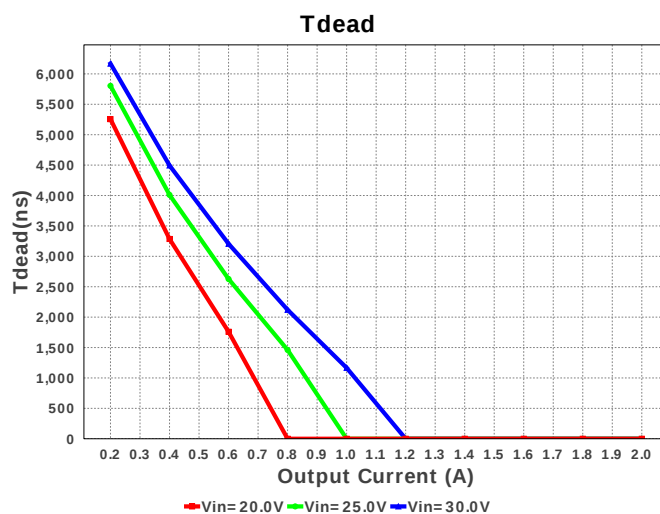
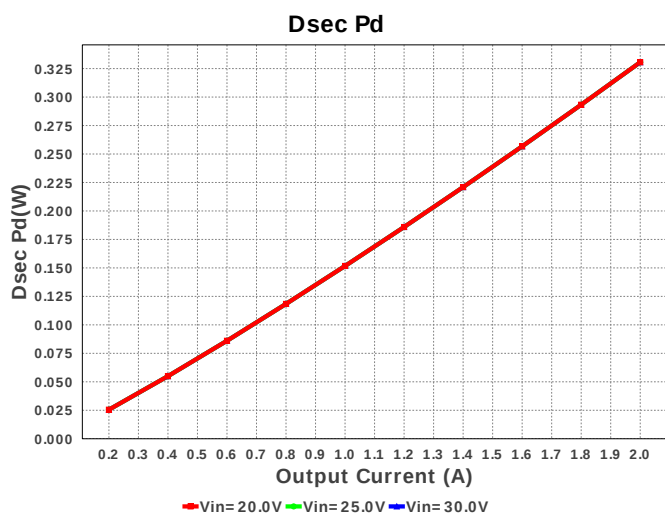
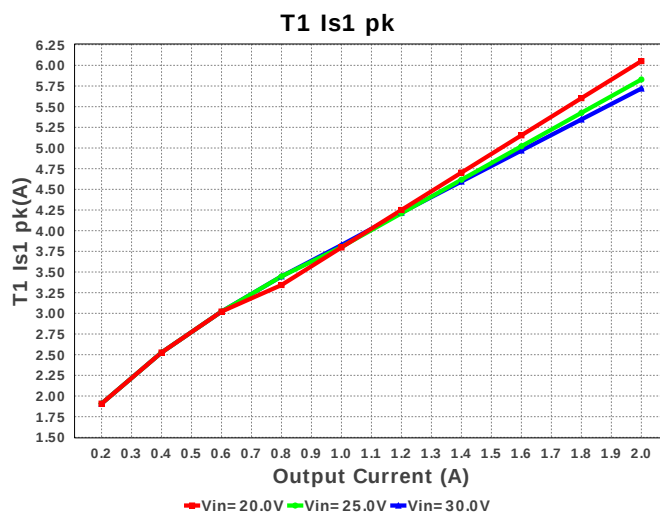
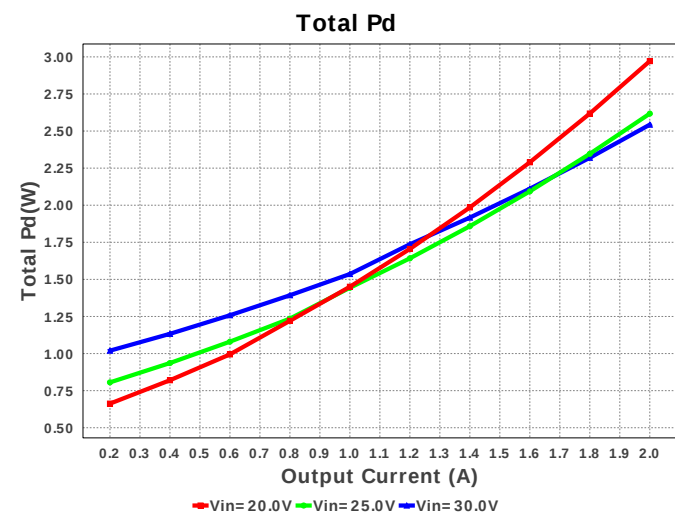


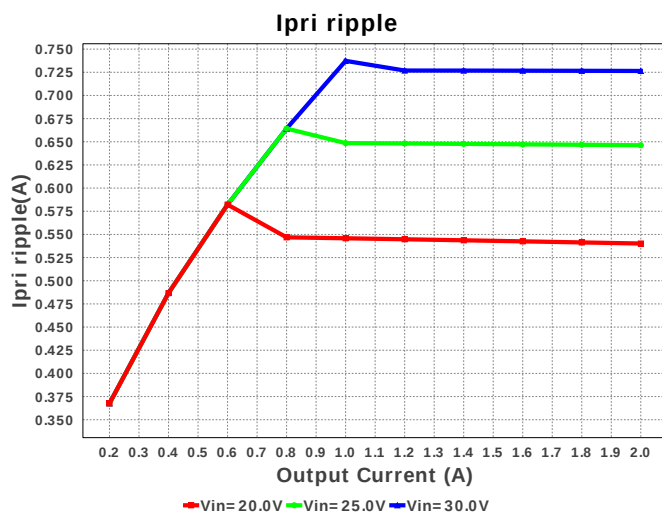
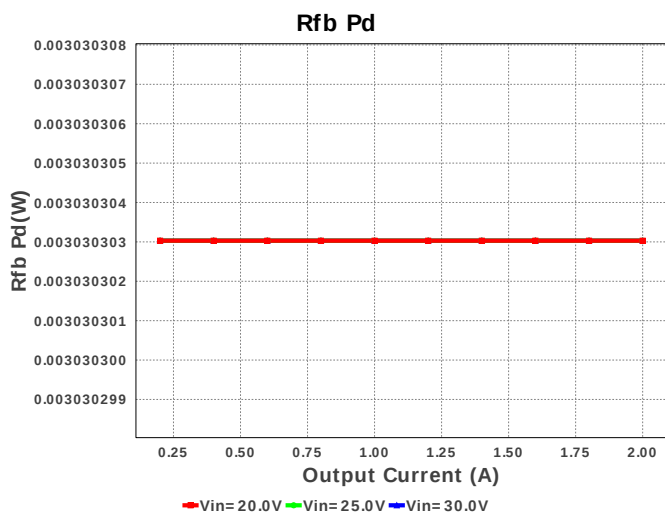
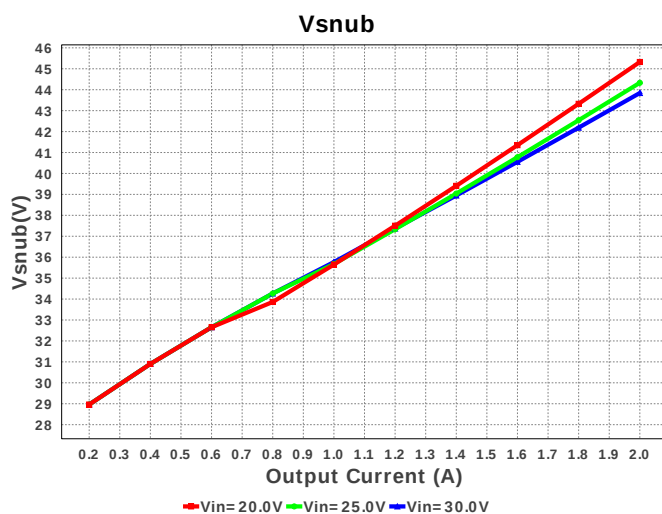
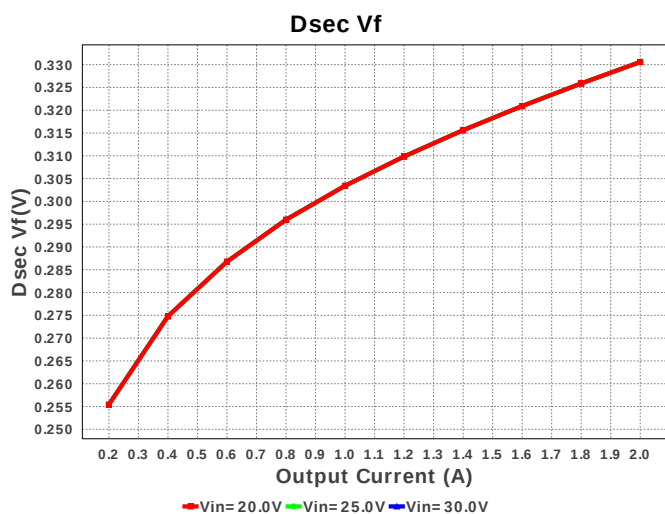
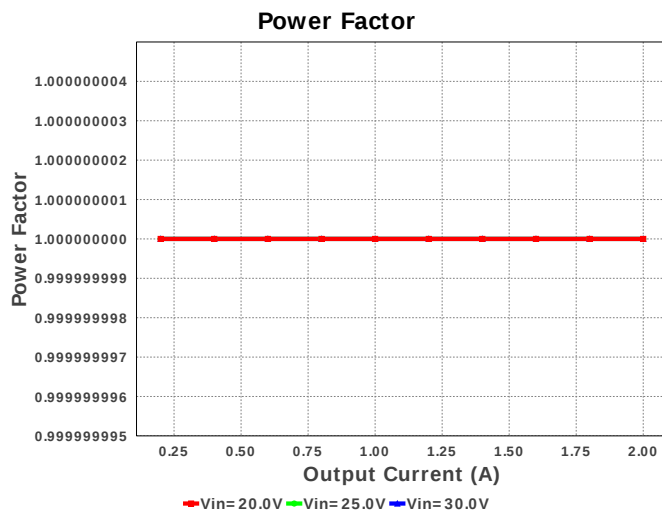
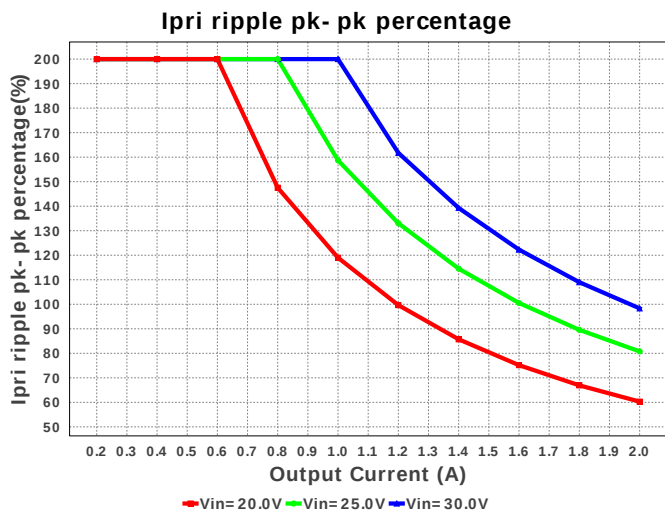
Cbulk Pd

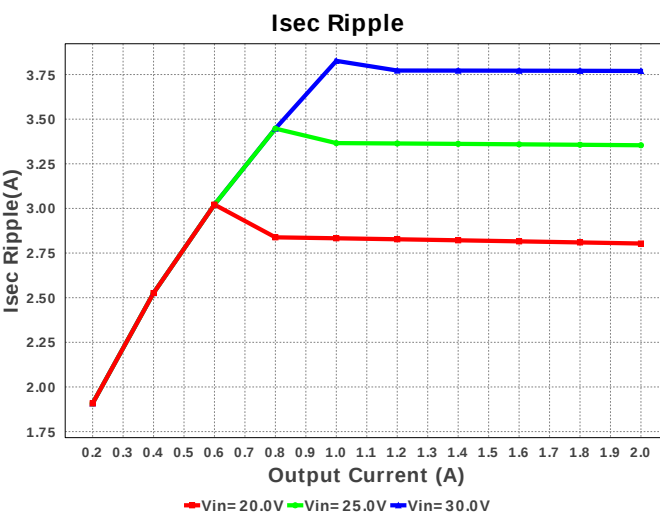
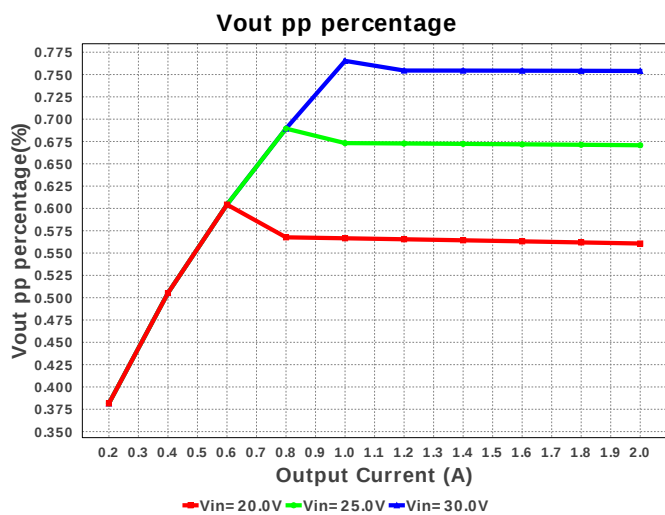
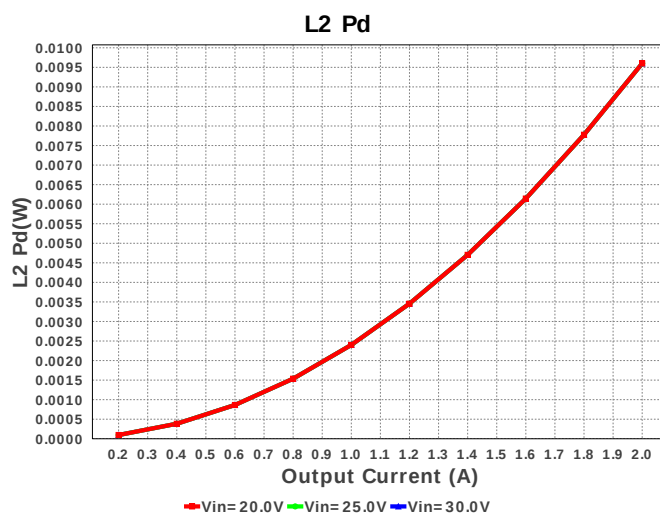
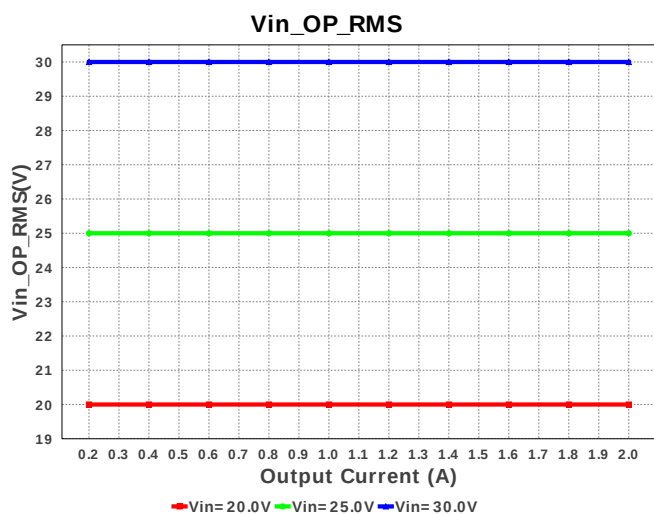
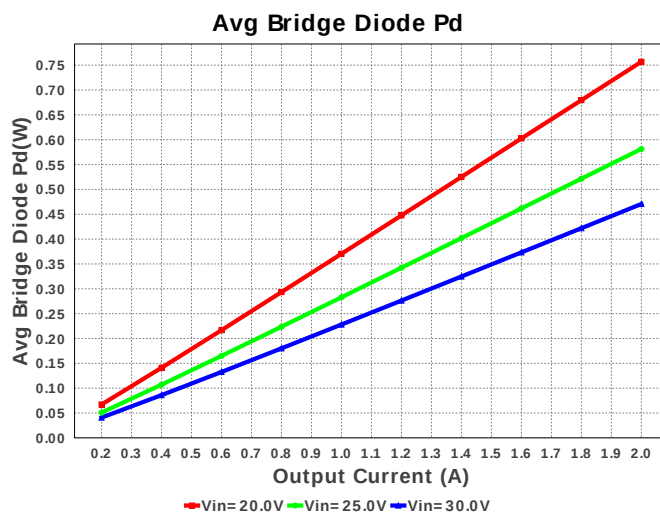
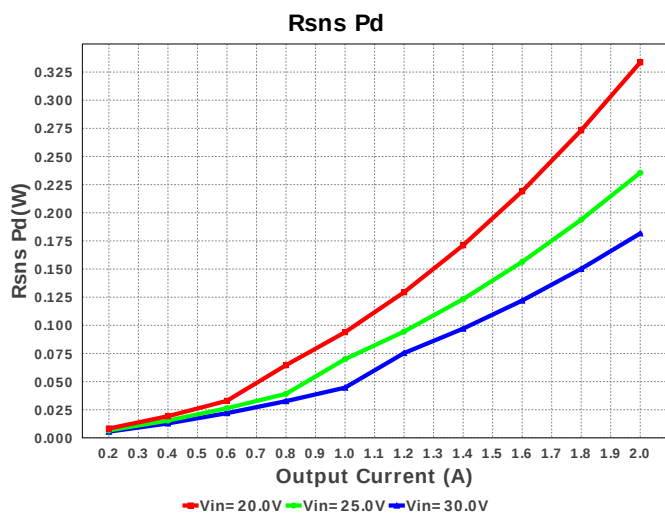


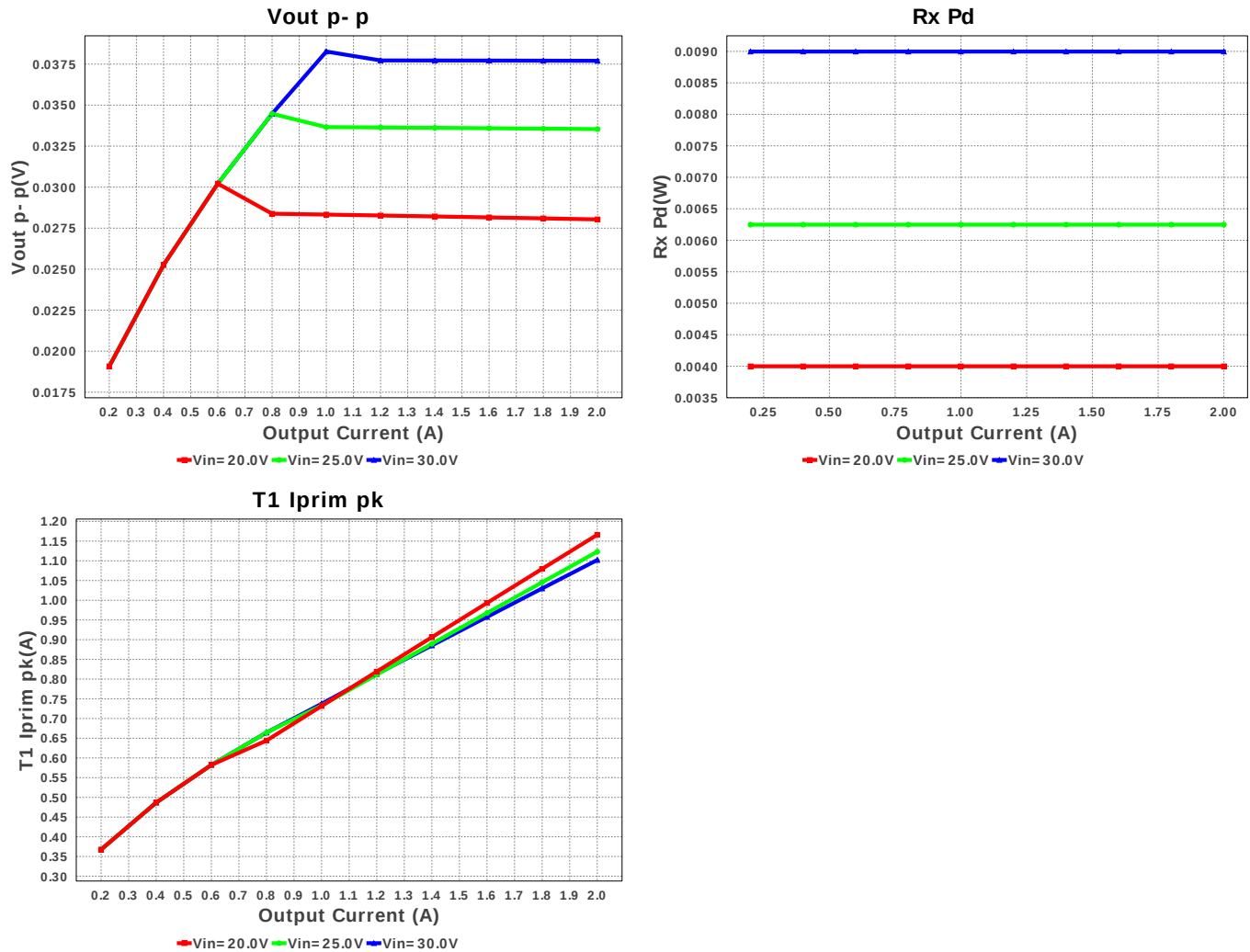












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	2.25 A	Current	Output capacitor1 RMS ripple current
2.	Iin rms	648.58 mA	Current	RMS Input Current
3.	Iout_DCM	661.91 mA	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	531.421 mA	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	540.176 mA	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	60.293 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	2.803 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	700.381 mA	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	1.166 A	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	3.01 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	6.051 A	Current	Transformer Secondary1 Peak Current
12.	AC Frequency	60.0 Hz	General	Input AC frequency
13.	BOM Count	53	General	Total Design BOM count
14.	Daux trr	4.0 ns	General	Auxiliary Diode Reverse Recovery Time
15.	Dsec Vf	330.58 mV	General	Effective Forward Voltage Drop at the Operating Current
16.	Dsec trr	0.0 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	0.0 ns	General	Snubber Diode Reverse Recovery Time
19.	FootPrint	3.644 k mm ²	General	Total Foot Print Area of BOM components
20.	Frequency	98.851 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	4.351 us	General	Approximate Converter Off Time
25.	Ton Act	6.001 us	General	Approximate Converter On Time
26.	Total BOM	\$0.0	General	Total BOM Cost
27.	Tsw	10.116 us	General	Switching Time Period
28.	Vaux	11.678 V	General	Auxiliary Voltage
29.	Vsnub	45.325 V	General	Voltage Across the Snubber

#	Name	Value	Category	Description
30.	Vout Actual	4.99 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	59.316 %	Op_point	Duty cycle
33.	Efficiency	77.092 %	Op_point	Steady state efficiency
34.	IC Tj	61.307 degC	Op_point	IC junction temperature
35.	ICThetaJA	160.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
36.	IOUT_OP	2.0 A	Op_point	Iout operating point
37.	M1 TjOP	31.737 degC	Op_point	M1 MOSFET junction temperature
38.	Peak Rectified Vin	28.284 V	Op_point	Peak voltage seen at rectified input
39.	Vin_OP_RMS	20.0 V	Op_point	AC Input RMS Voltage
40.	Vout p-p	28.034 mV	Op_point	Peak-to-peak output ripple voltage
41.	Avg Bridge Diode Pd	756.846 mW	Power	Average Power Dissipation in the Bridge Diode over the AC Line Period
42.	Cbulk Pd	281.119 mW	Power	Bulk capacitor power dissipation
43.	Cout1 Pd	50.622 mW	Power	Output capacitor1 power dissipation
44.	Cx Pd	568.074 pW	Power	X-cap Power Dissipation
45.	Cy Pd	187.5 pW	Power	Y-caps Power Dissipation
46.	Dsec Pd	330.58 mW	Power	Secondary Diode Power Dissipation
47.	Dsec2 Pd	397.923 mW	Power	Secondary Diode Power Dissipation
48.	IC Pd	195.667 mW	Power	IC power dissipation
49.	L1 Pd	20.187 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	32.772 mW	Power	M1 MOSFET total power dissipation
52.	Paux	36.323 mW	Power	Power Dissipation in Raux and Daux
53.	Pd Rstartup	149.342 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
54.	Rdrv Pd	7.319 μ W	Power	Power Dissipation in Gate Drive Resistor
55.	Rfb Pd	3.03 mW	Power	Rfb Power Dissipation
56.	Rsns Pd	333.563 mW	Power	Current Limit Sense Resistor Power Dissipation
57.	Rx Pd	3.999 mW	Power	Total Power Dissipation in Rx1 and Rx2
58.	Snubber Pd	166.913 mW	Power	Snubber Power Dissipation
59.	T1 Pd	1.009 W	Power	Estimated Losses in Transformer
60.	Total Pd	2.972 W	Power	Total Power Dissipation
61.	Vout Tolerance	2.173 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
62.	Vout pp percentage	560.685 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	30.0	Maximum input voltage
3.	VinMin	20.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	acFrequency	60.0	Light Output in Lumen
6.	base_pn	UC1843	Texas Instruments Base Part Number
7.	source	AC	Input Source Type
8.	ta	30.0	Ambient temperature

Design Assistance

1. UC1843 Product Folder : <http://www.ti.com/product/UC1843> : contains the data sheet and other resources.

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