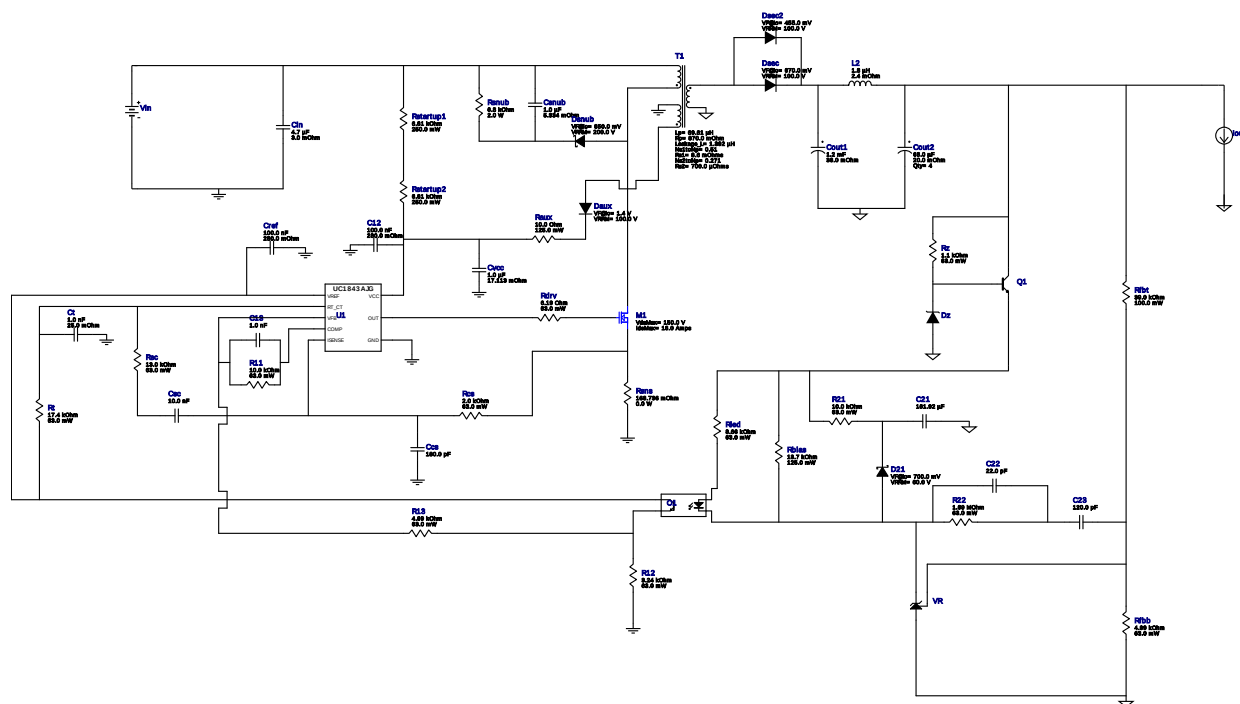


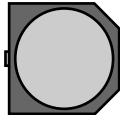
WEBENCH® Design Report

Design : 4738744/20 UC1843AJ
UC1843AJ 32.0V-34.0V to 22.00V @ 2.0A



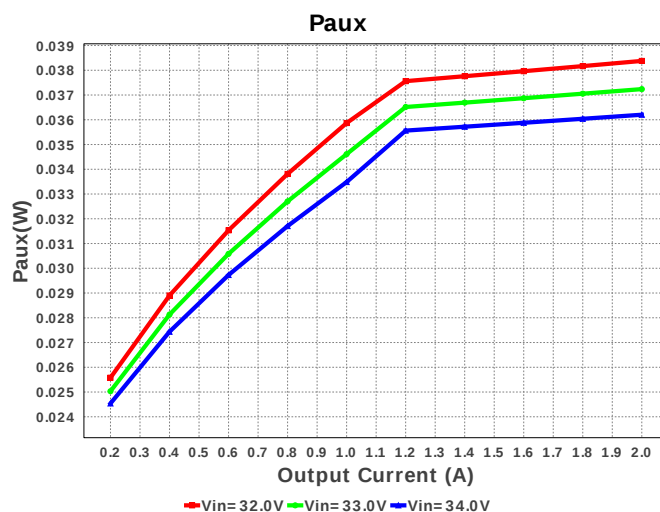
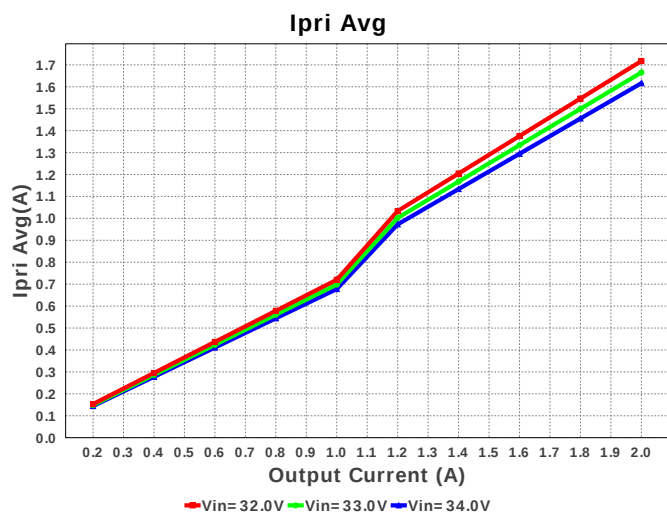
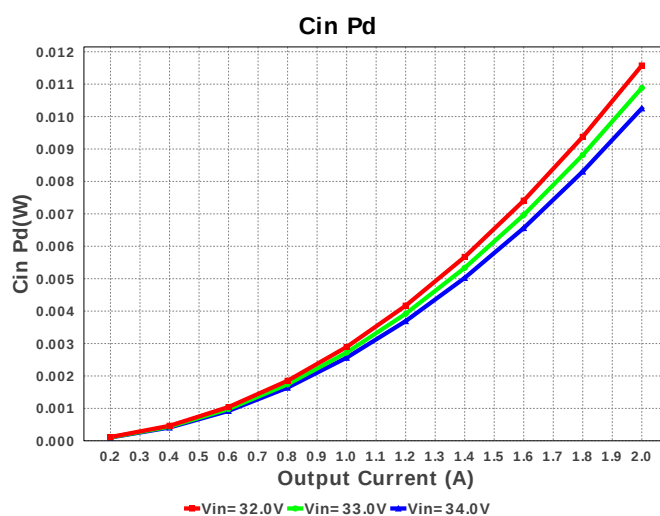
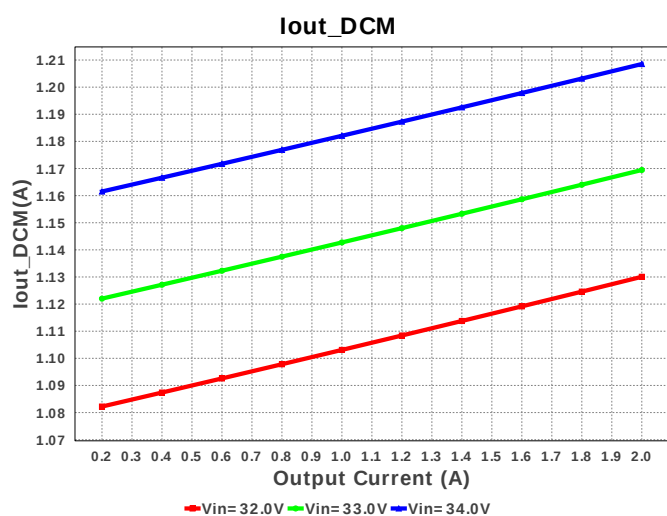
Electrical BOM

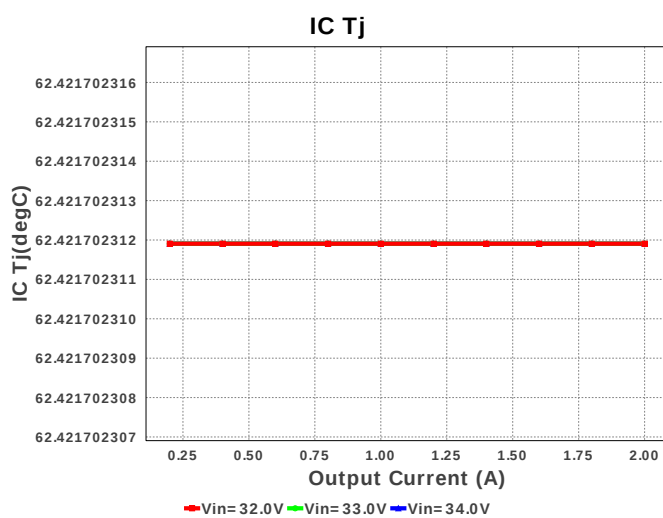
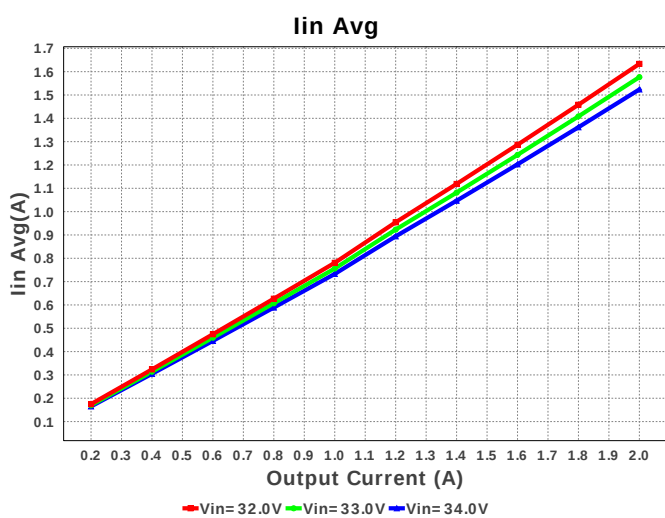
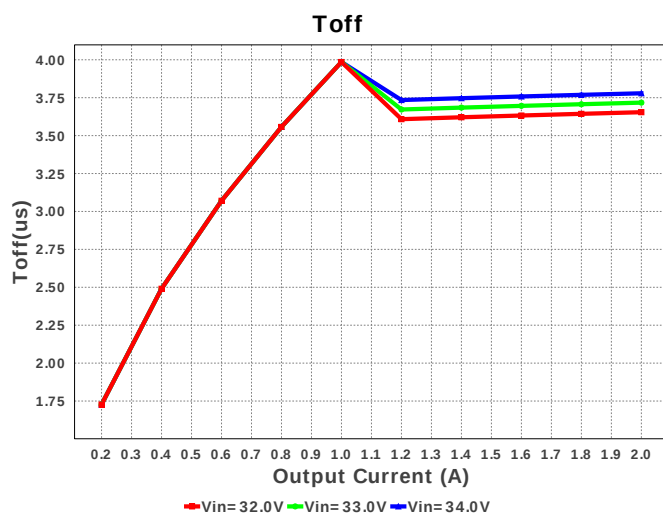
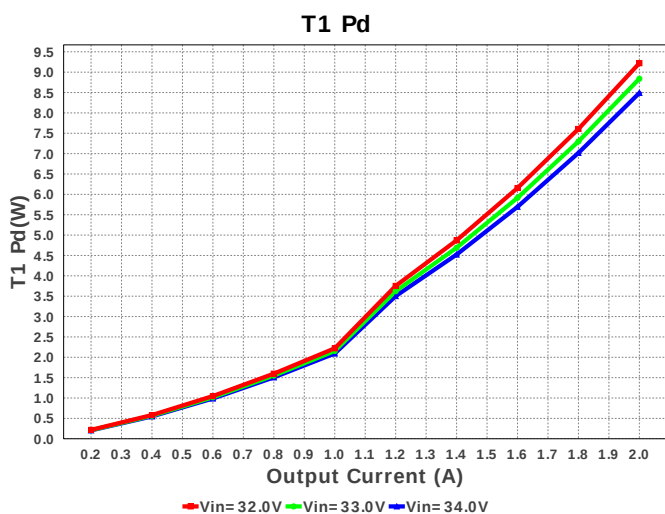
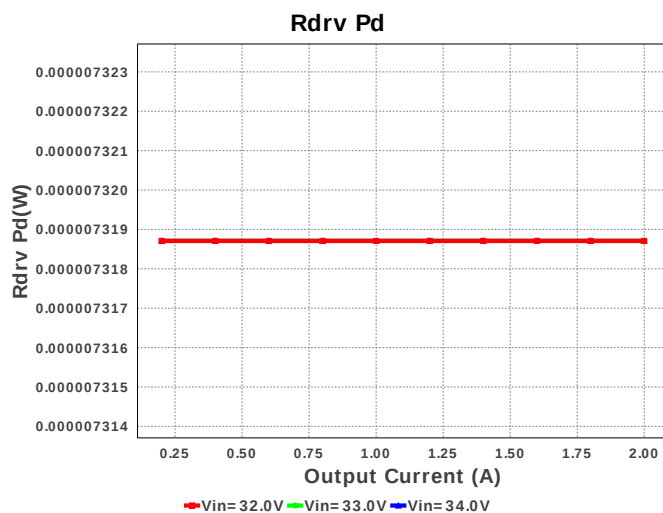
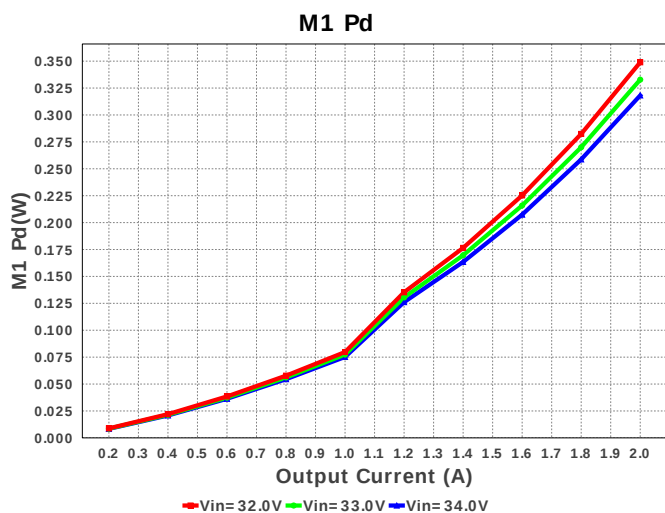
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C12	AVX	0805C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	C13	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	C21	CUSTOM	CUSTOM Series= ?	Cap= 161.92 uF VDC= 40.0 V IRMS= 0.0 A	1	NA	CUSTOM 0 mm ²
4.	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
5.	C23	Samsung Electro-Mechanics	CL21C121JB61PNC Series= C0G/NP0	Cap= 120.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
6.	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
7.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	\$0.07	1206 11 mm ²
8.	Cout1	TDK	B41607A8128M002 Series= 2360	Cap= 1.2 mF ESR= 38.0 mOhm VDC= 63.0 V IRMS= 11.4 A	1	\$4.21	B41607_2500x4000_2 729 mm ²

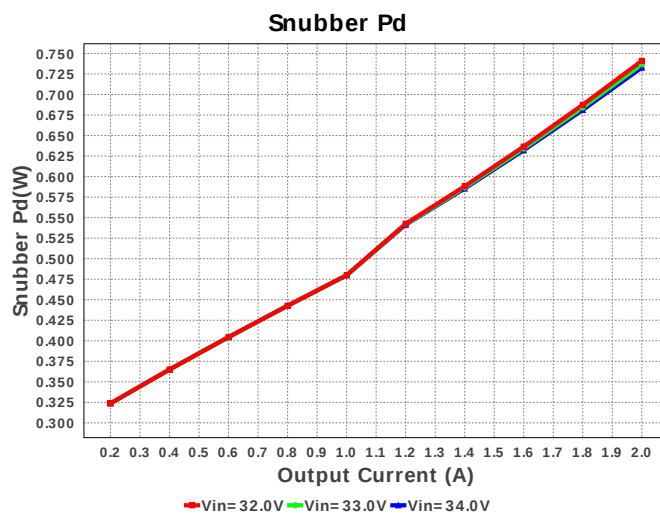
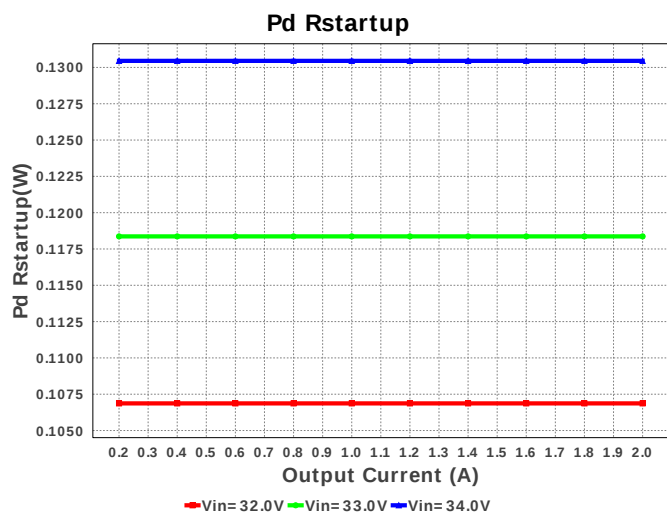
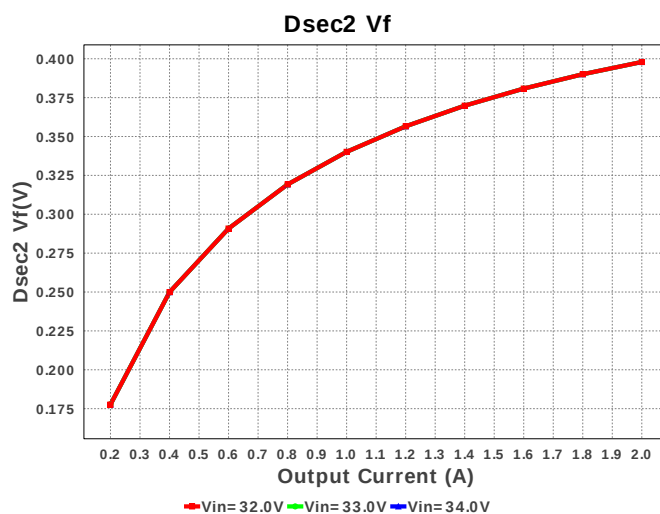
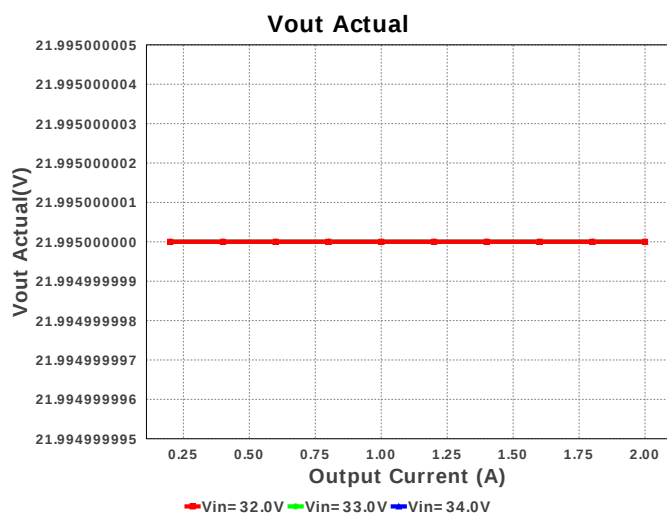
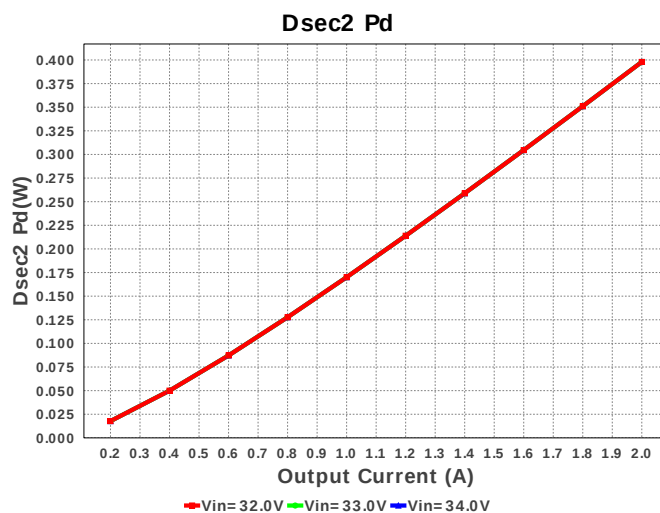
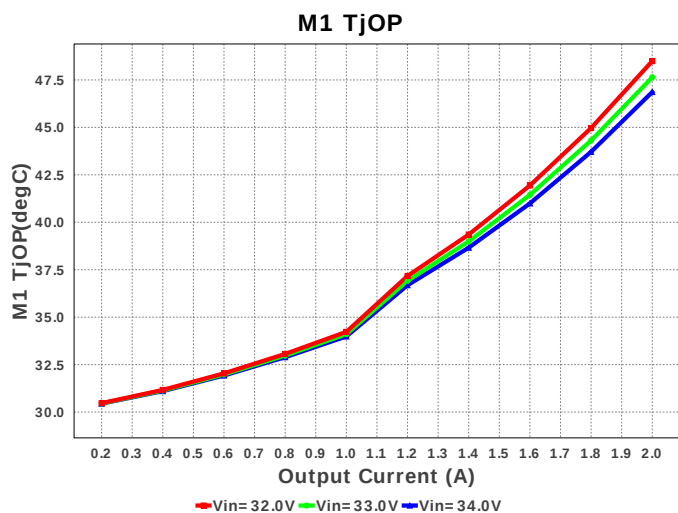
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9.	Cout2	Panasonic	50SVPF68M Series= ?	Cap= 68.0 uF ESR= 20.0 mOhm VDC= 50.0 V IRMS= 4.3 A	4	\$0.92	 CAPSMT_62_F12 151 mm²
10.	Cref	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm²
11.	Csc	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm²
12.	Csnub	MuRata	GRM31CR72A105KA01L Series= X7R	Cap= 1.0 uF ESR= 5.334 mOhm VDC= 100.0 V IRMS= 1.55432 A	1	\$0.11	 1206_190 11 mm²
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 mm²
14.	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 mm²
15.	D21	Diodes Inc.	B160-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	\$0.06	 SMA 37 mm²
16.	Daux	NXP Semiconductor	BAS316,115	VF@Io= 1.4 V VRRM= 100.0 V	1	\$0.02	 SOD-323 9 mm²
17.	Dsec	Fairchild Semiconductor	FSV8100V	VF@Io= 670.0 mV VRRM= 100.0 V	1	\$0.21	 TO-277A 56 mm²
18.	Dsec2	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm²
19.	Dsnub	Diodes Inc.	DFLS1200-7	VF@Io= 850.0 mV VRRM= 200.0 V	1	\$0.21	 PowerDI123 13 mm²
20.	Dz	Diodes Inc.	MMSZ5250B-7-F	Zener	1	\$0.03	 SOD-123 13 mm²
21.	L2	Coilcraft	SER1360-182KLB	L= 1.8 uH DCR= 2.4 mOhm	1	\$0.72	 SER1360 225 mm²
22.	M1	Fairchild Semiconductor	FDMC86240	VdsMax= 150.0 V IdsMax= 16.0 Amps	1	\$0.93	 TRANS_Fairchild_MLP08S 18 mm²
23.	O1	Vishay-Semiconductor	TCMT1107	Optocoupler	1	\$0.21	 SOP-4 44 mm²
24.	Q1	ON Semiconductor	BC846BLT1G	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm²
25.	R11	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²

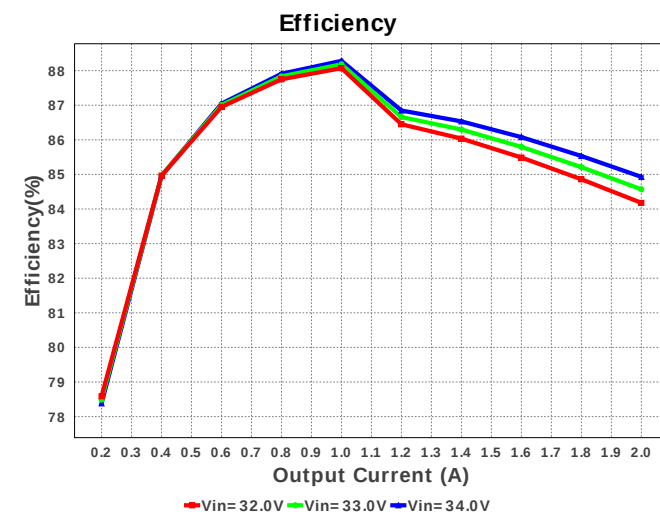
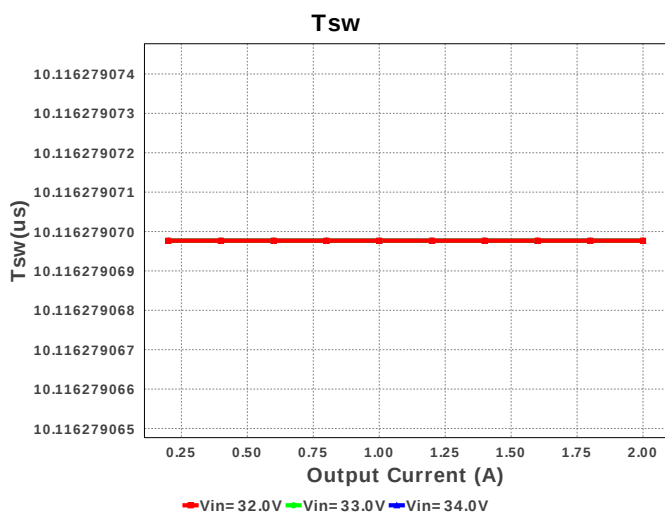
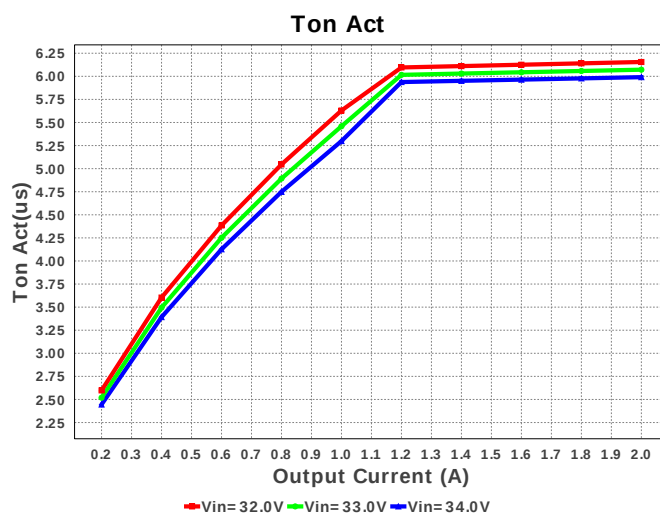
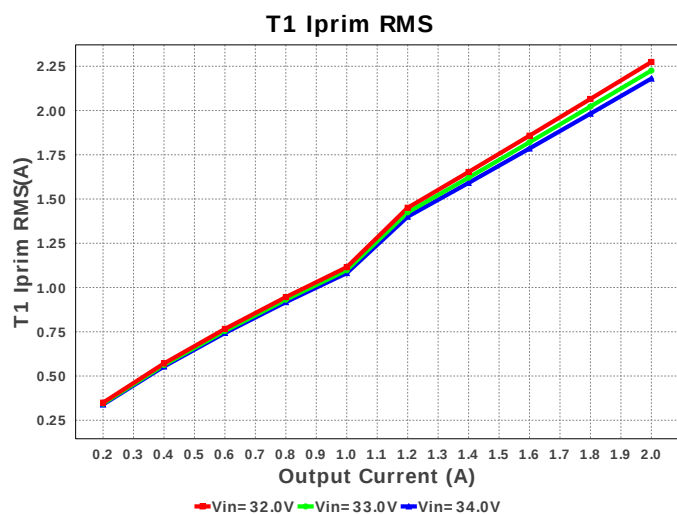
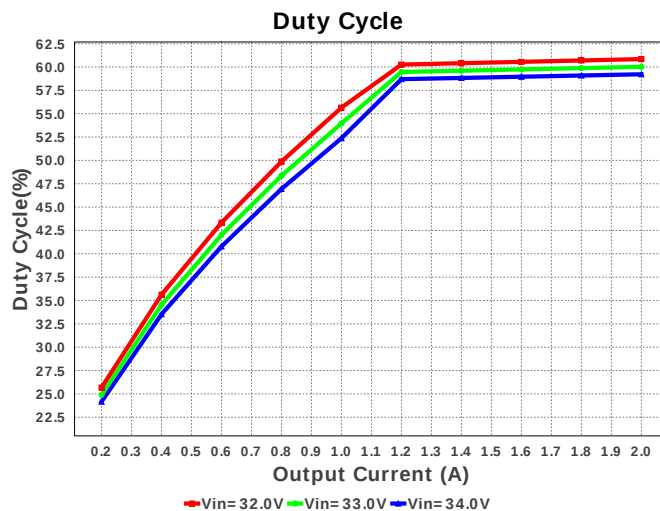
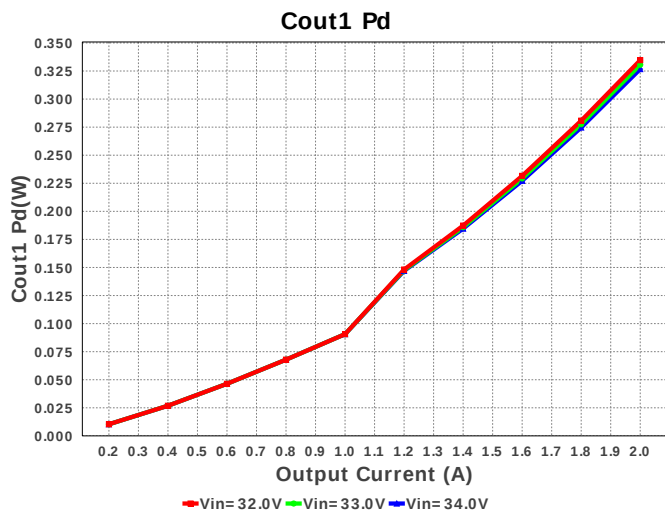
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
26.	R12	Vishay-Dale	CRCW04023K24FKED Series= CRCW..e3	Res= 3.24 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
27.	R13	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
28.	R21	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
29.	R22	Vishay-Dale	CRCW04021M69FKED Series= CRCW..e3	Res= 1.69 MOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
30.	Raux	Vishay-Dale	CRCW080510R0FKEA Series= CRCW..e3	Res= 10.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
31.	Rbias	Panasonic	ERJ-6ENF1372V Series= ERJ-6E	Res= 13.7 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
32.	Rcs	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
33.	Rdrv	Vishay-Dale	CRCW04026R19FKED Series= CRCW..e3	Res= 6.19 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
34.	Rfbb	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
35.	Rfbt	Yageo America	RC0603FR-0739KL Series= ?	Res= 39.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm²
36.	Rled	Vishay-Dale	CRCW04028K66FKED Series= CRCW..e3	Res= 8.66 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
37.	Rsc	Vishay-Dale	CRCW040213K0FKED Series= CRCW..e3	Res= 13.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
38.	Rsns	CUSTOM	CUSTOM Series= ?	Res= 168.736 mOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
39.	Rsns	Vishay-Bccomponents	PR02000206801JR500 Series= ?	Res= 6.8 kOhm Power= 2.0 W Tolerance= 5.0%	1	\$0.05	PR02 113 mm²
40.	Rstartup1	Panasonic	ERJ-8ENF6811V Series= ERJ-8E	Res= 6.81 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
41.	Rstartup2	Panasonic	ERJ-8ENF6811V Series= ERJ-8E	Res= 6.81 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
42.	Rt	Vishay-Dale	CRCW040217K4FKED Series= CRCW..e3	Res= 17.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
43.	Rz	Vishay-Dale	CRCW04021K10FKED Series= CRCW..e3	Res= 1.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
44.	T1	CUSTOM	CUSTOM	Lp= 69.61 µH Rp= 870.0 mOhm Leakage_L= 1.392 µH Ns1toNp= 0.51 Rs1= 8.6 mOhms Ns2toNp= 0.271 Rs2= 700.0 µOhms	1	NA	CUSTOM 0 mm²

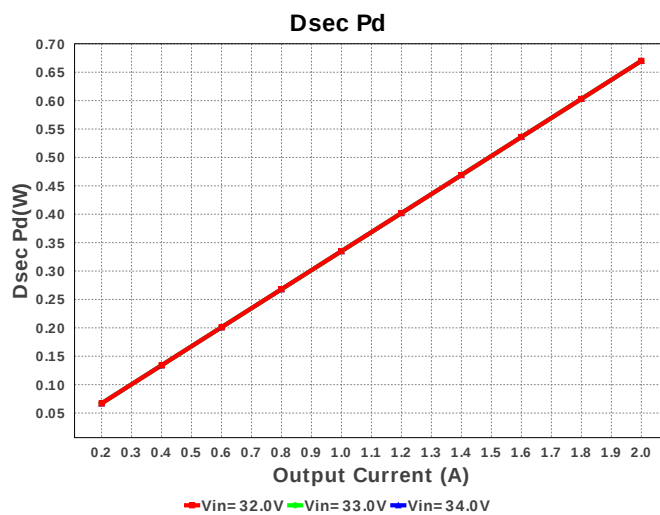
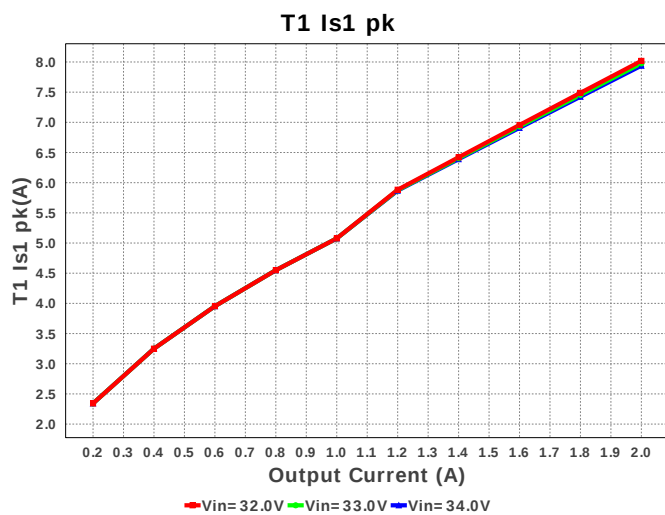
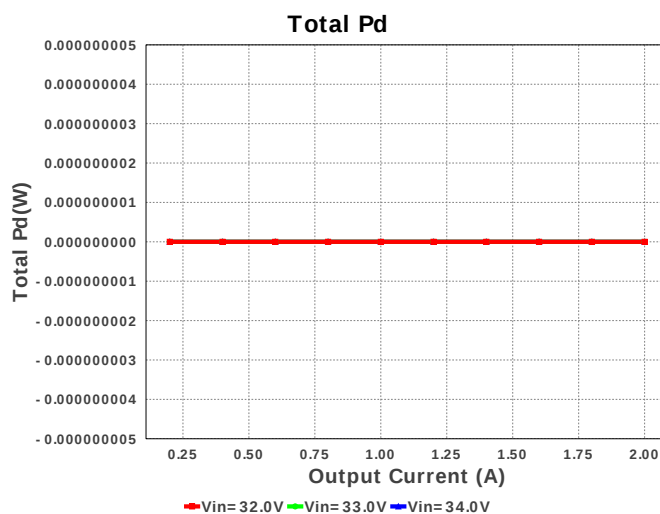
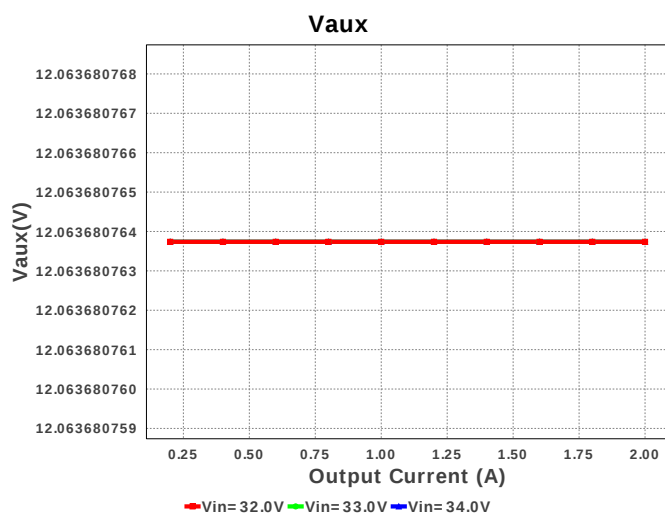
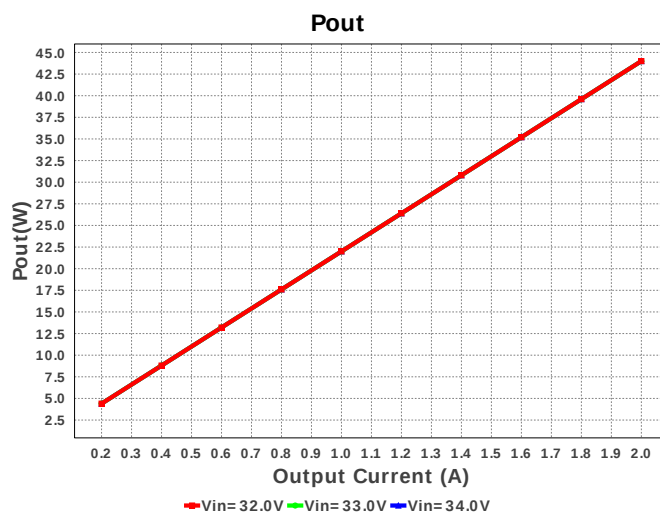
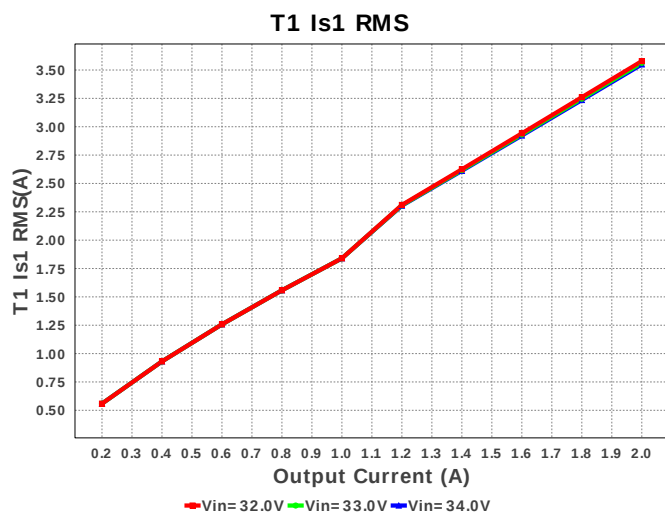
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
45.	U1	Texas Instruments	UC1843AJ	Switcher	1	\$15.60	 JG0008A 111 mm ²
46.	VR	Texas Instruments	TL431AIDBVR	Voltage References	1	\$0.07	 R-PDSO-G3 16 mm ²

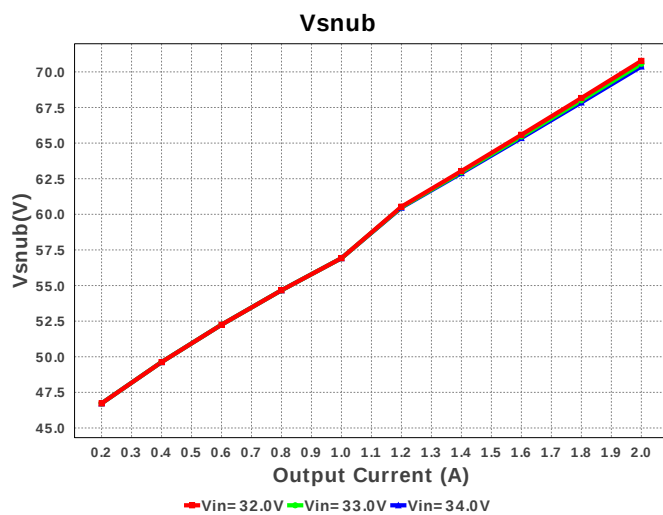
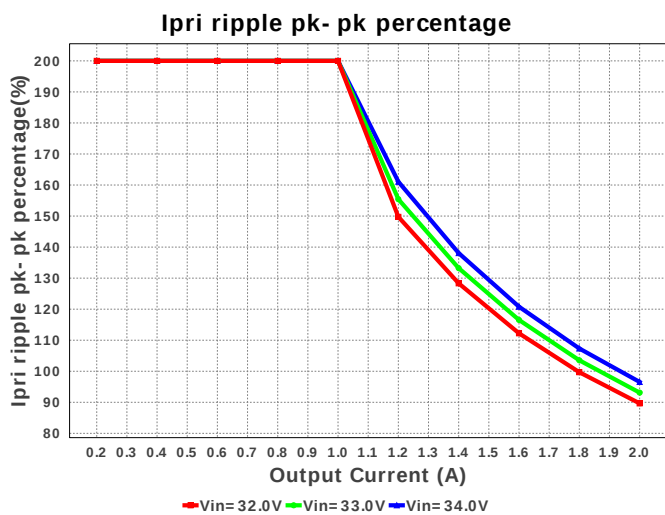
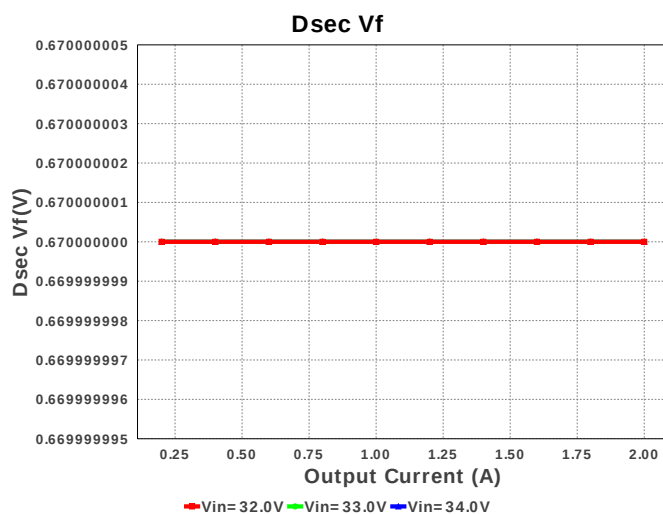
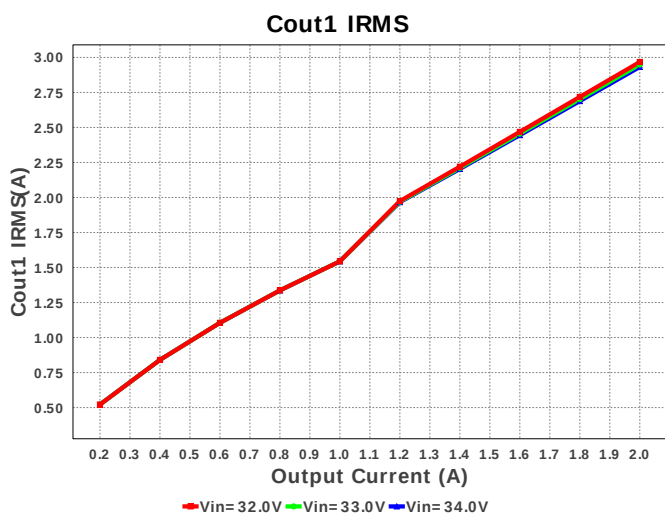
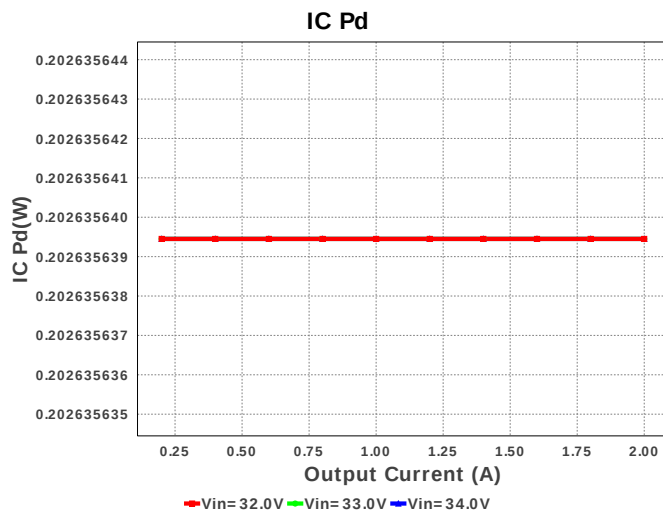
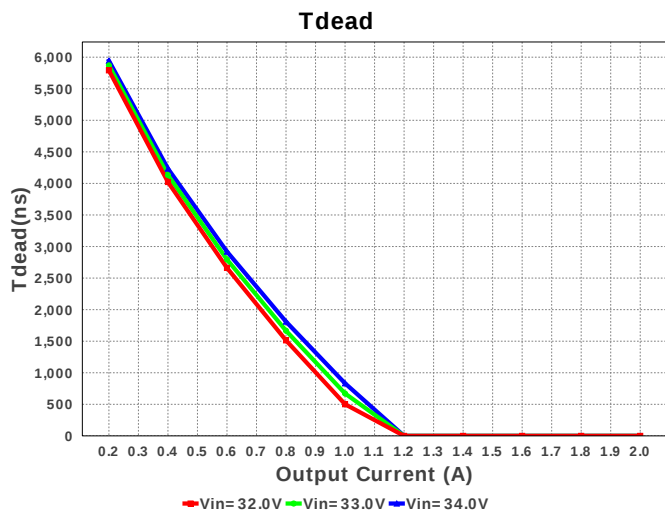


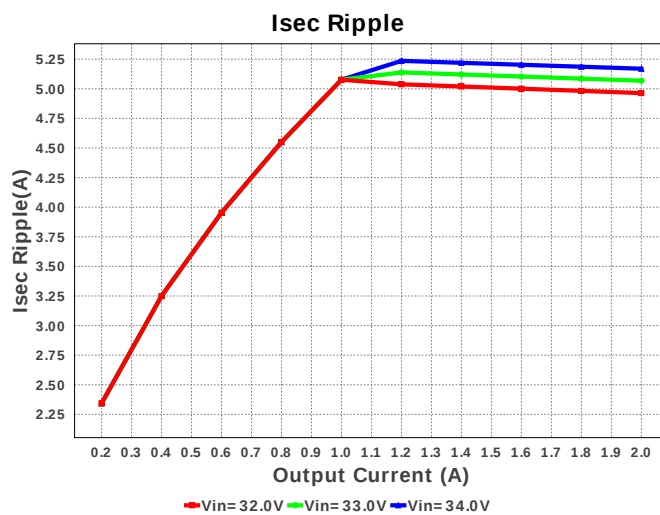
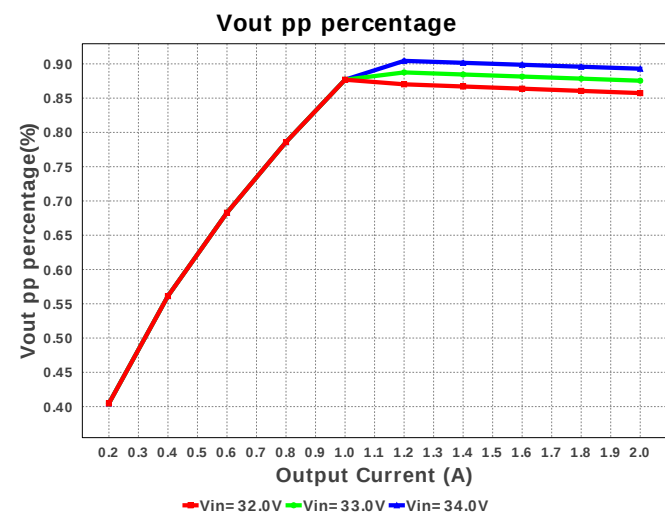
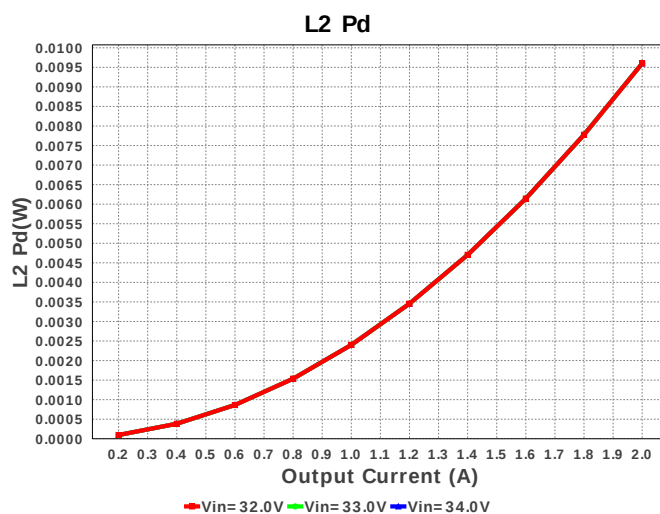
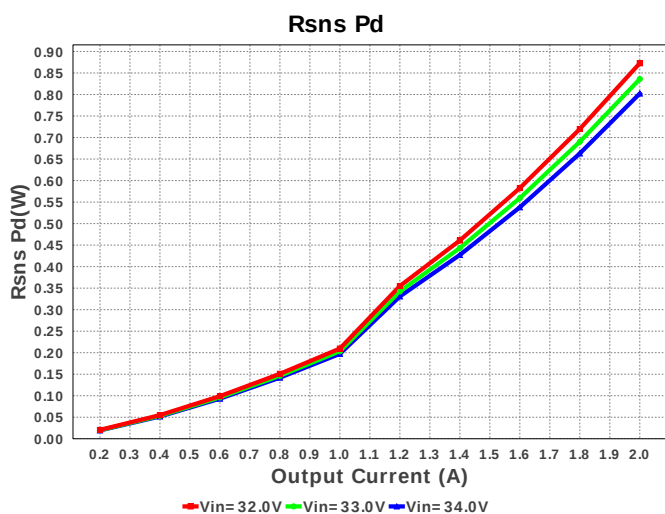
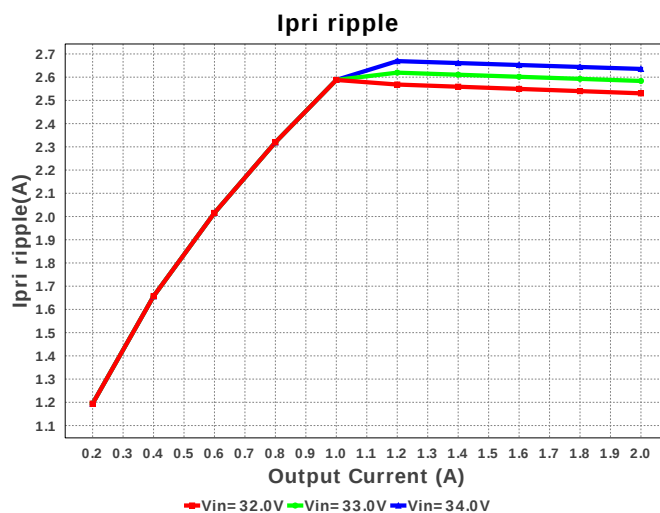
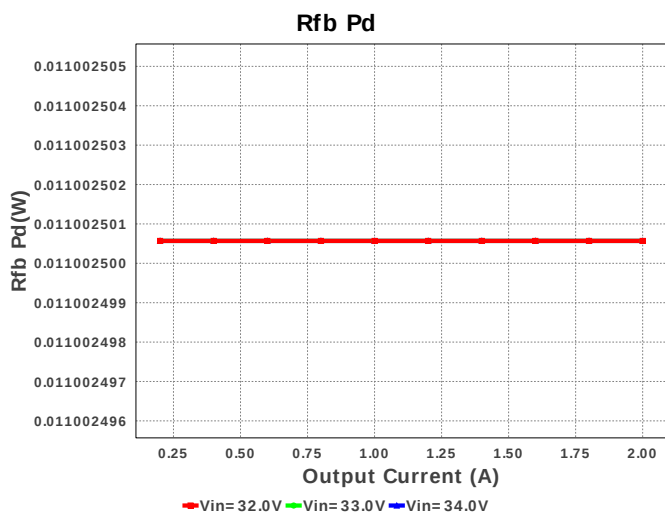


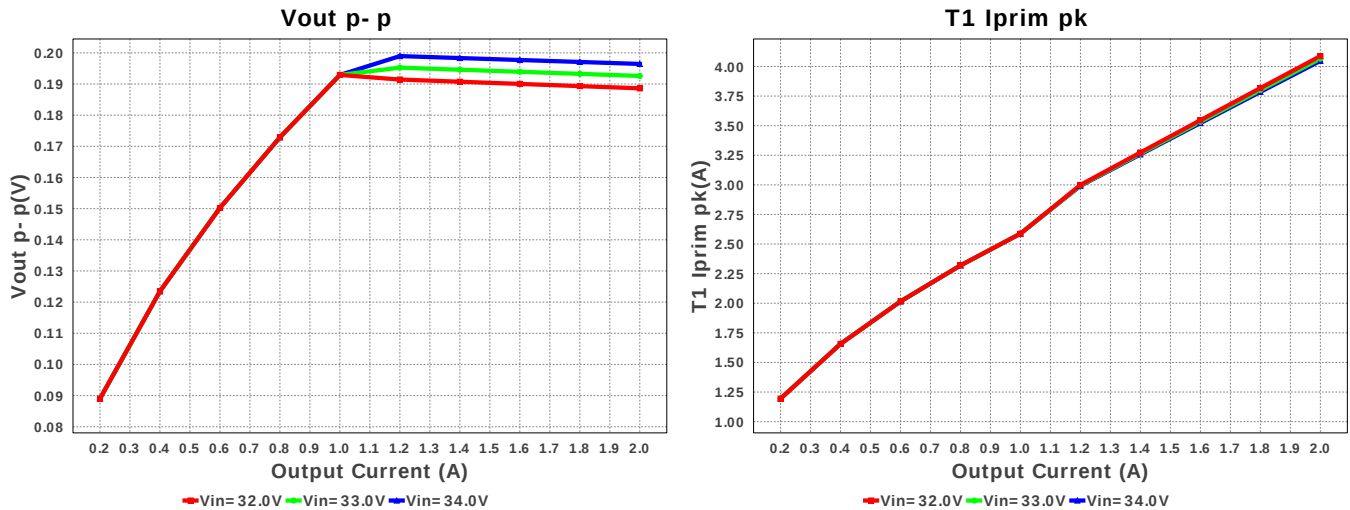












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	2.968 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	1.633 A	Current	Average input current
3.	Iout_DCM	1.13 A	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	1.717 A	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	2.53 A	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	89.65 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	4.964 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	2.274 A	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	4.088 A	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	3.579 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	8.018 A	Current	Transformer Secondary1 Peak Current
12.	BOM Count	49	General	Total Design BOM count
13.	Daux trr	4.0 ns	General	Auxiliary Diode Reverse Recovery Time
14.	Dsec Vf	670.0 mV	General	Effective Forward Voltage Drop at the Operating Current
15.	Dsec trr	19.64 ns	General	Output Diode Reverse Recovery Time
16.	Dsec2 Vf	397.923 mV	General	Effective Forward Voltage Drop at the Operating Current
17.	Dsnub trr	0.0 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	2.385 k mm ²	General	Total Foot Print Area of BOM components
19.	Frequency	98.851 kHz	General	Switching frequency
20.	Pout	44.0 W	General	Total output power
21.	Tdead	0.0 ns	General	Approximate Dead Time of the Regulator
22.	Toff	3.654 us	General	Approximate Converter Off Time
23.	Ton Act	6.155 us	General	Approximate Converter On Time
24.	Total BOM	\$0.0	General	Total BOM Cost
25.	Tsw	10.116 us	General	Switching Time Period
26.	Vaux	12.064 V	General	Auxiliary Voltage
27.	Vsnub	70.773 V	General	Voltage Across the Snubber
28.	Vout Actual	21.995 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
29.	Vout OP	22.0 V	Op_Point	Operational Output Voltage
30.	Duty Cycle	60.846 %	Op_point	Duty cycle
31.	Efficiency	84.178 %	Op_point	Steady state efficiency
32.	IC Tj	62.422 degC	Op_point	IC junction temperature
33.	ICThetaJA	160.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
34.	IOUT_OP	2.0 A	Op_point	Iout operating point
35.	M1 TJOP	48.493 degC	Op_point	M1 MOSFET junction temperature
36.	Vout p-p	188.617 mV	Op_point	Peak-to-peak output ripple voltage
37.	Cin Pd	11.575 mW	Power	Input capacitor power dissipation
38.	Cout1 Pd	334.643 mW	Power	Output capacitor1 power dissipation
39.	Dsec Pd	670.0 mW	Power	Secondary Diode Power Dissipation
40.	Dsec2 Pd	397.923 mW	Power	Secondary Diode Power Dissipation
41.	IC Pd	202.636 mW	Power	IC power dissipation
42.	L2 Pd	9.6 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
43.	M1 Pd	348.922 mW	Power	M1 MOSFET total power dissipation
44.	Paux	38.378 mW	Power	Power Dissipation in Raux and Daux
45.	Pd Rstartup	106.868 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
46.	Rdrv Pd	7.319 μW	Power	Power Dissipation in Gate Drive Resistor
47.	Rfb Pd	11.003 mW	Power	Rfb Power Dissipation
48.	Rsns Pd	872.712 mW	Power	Current Limit Sense Resistor Power Dissipation
49.	Snubber Pd	740.97 mW	Power	Snubber Power Dissipation
50.	T1 Pd	9.22 W	Power	Estimated Losses in Transformer

#	Name	Value	Category	Description
51.	Total Pd	0.0 W	Power	Total Power Dissipation
52.	Vout Tolerance	2.117 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
53.	Vout pp percentage	857.35 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	Iout1	2.0	Output Current #1
3.	Iout2	3.0	Output Current #2
4.	Iout3	2.0	Output Current #3
5.	VinMax	34.0	Maximum input voltage
6.	VinMin	32.0	Minimum input voltage
7.	Vout	22.0	Output Voltage
8.	Vout1	22.0	Output Voltage #1
9.	Vout2	6.0	Output Voltage #2
10.	Vout3	13.0	Output Voltage #3
11.	base_pn	UC1843A	Texas Instruments Base Part Number
12.	source	DC	Input Source Type
13.	ta	30.0	Ambient temperature

Design Assistance

1. UC1843A Product Folder : <http://www.ti.com/product/UC1843A> : contains the data sheet and other resources.

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