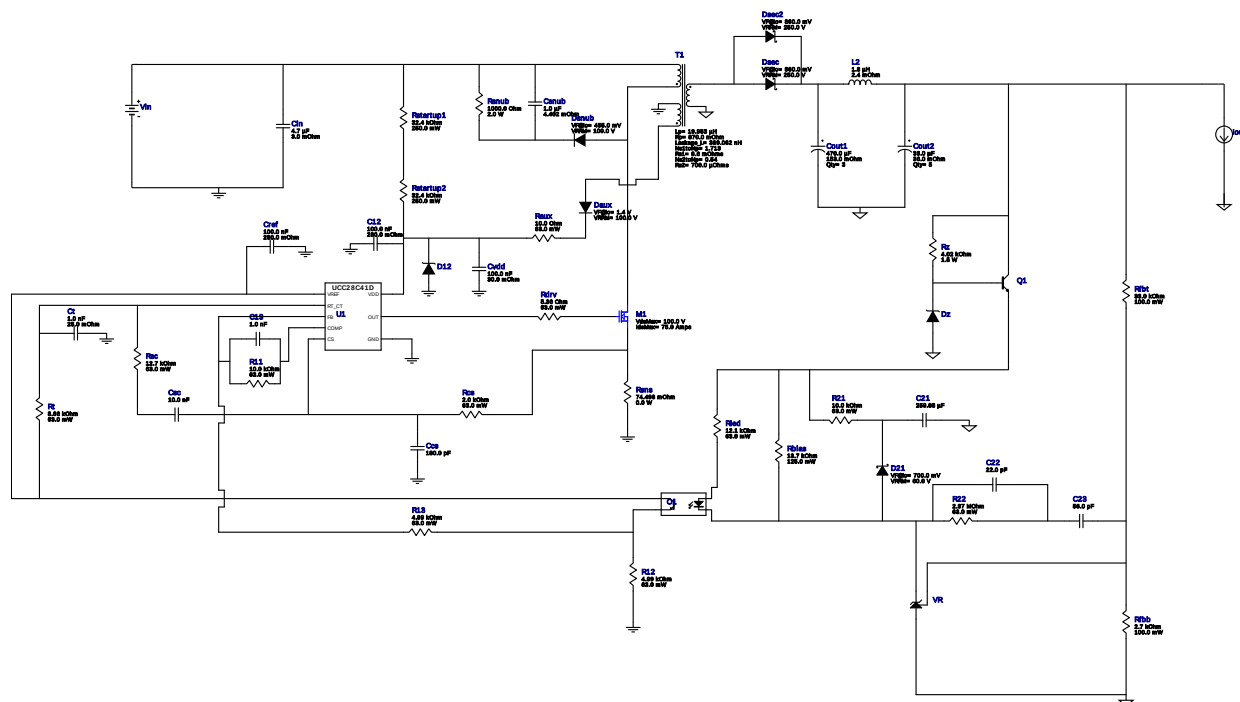
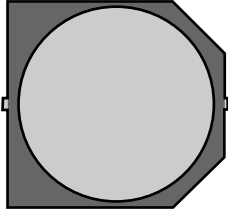
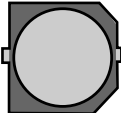
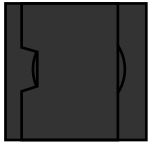




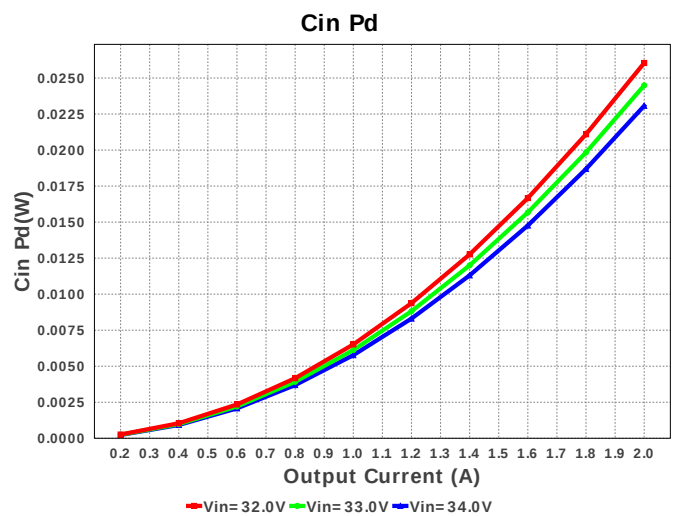
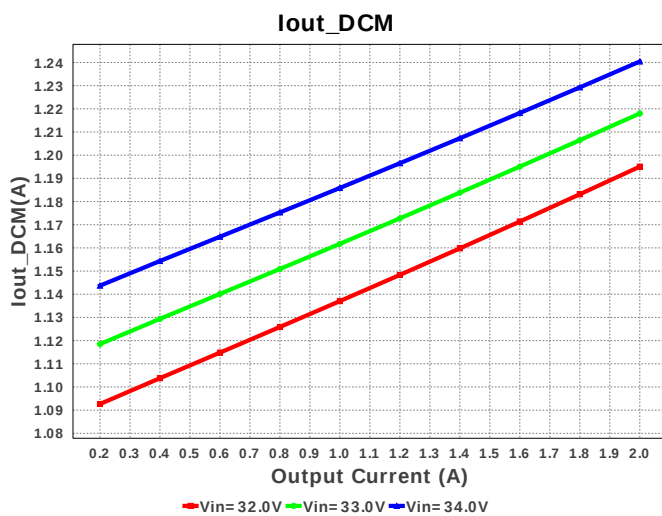
Electrical BOM

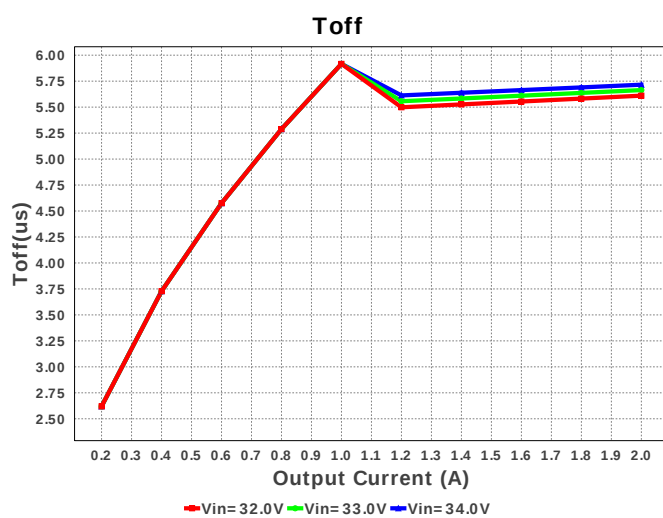
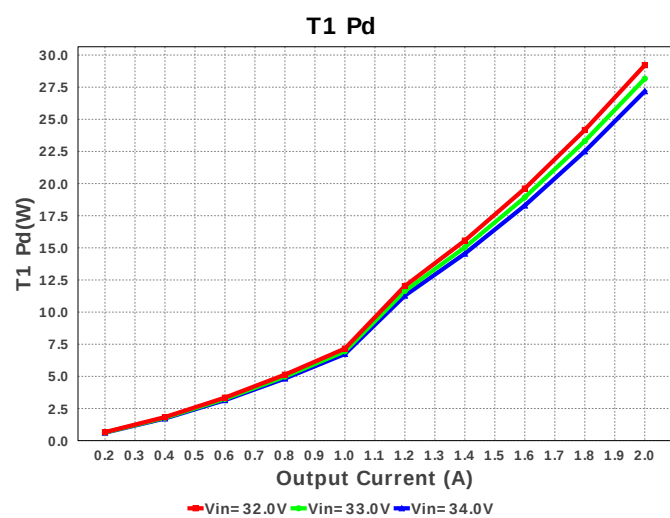
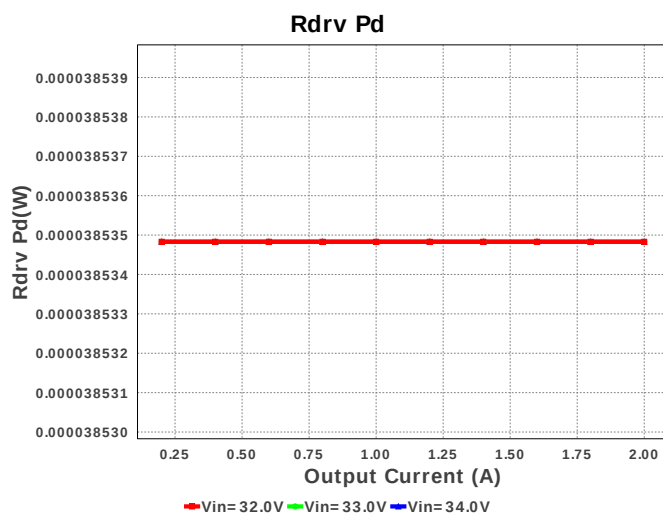
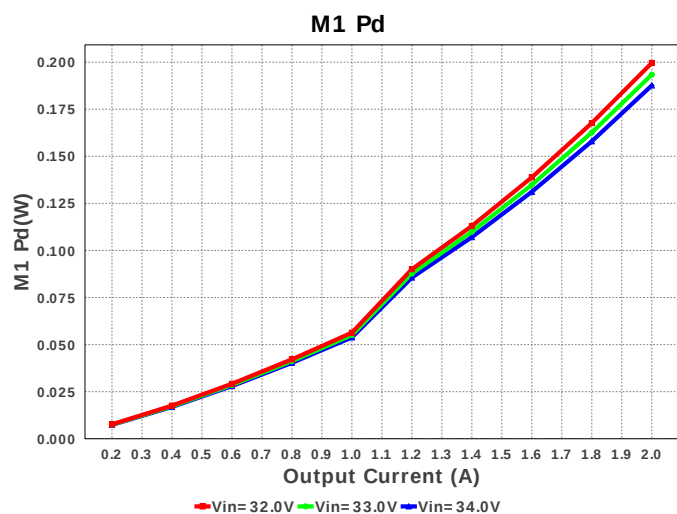
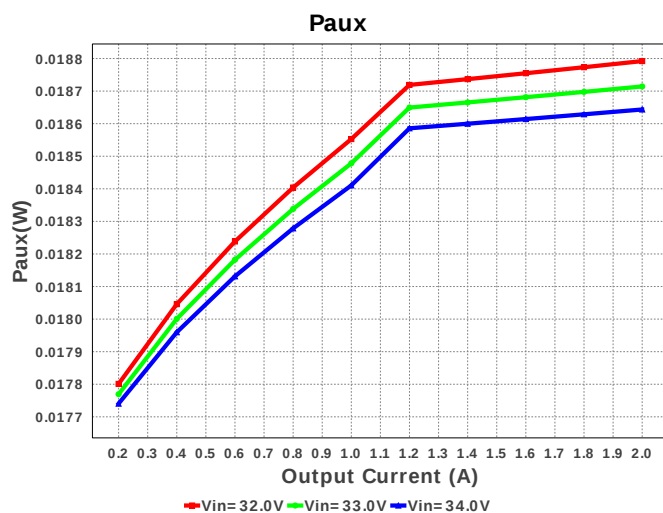
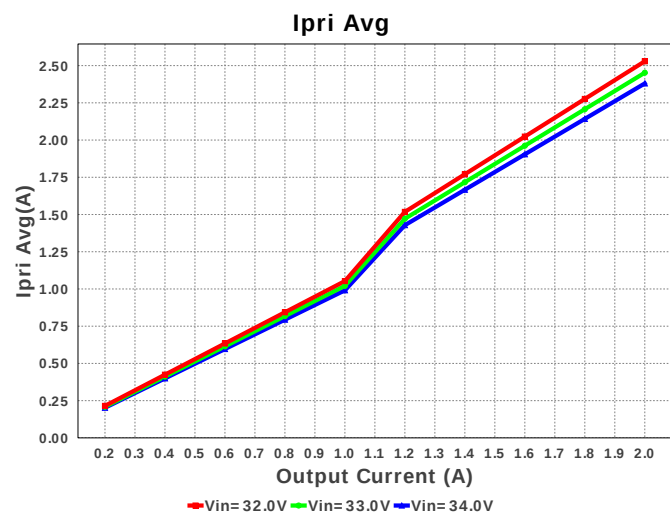
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C12	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	C13	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	C21	CUSTOM	CUSTOM Series= ?	Cap= 259.88 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	Yageo America	CC0805JRNPO9BN560 Series= C0G/NP0	Cap= 56.0 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

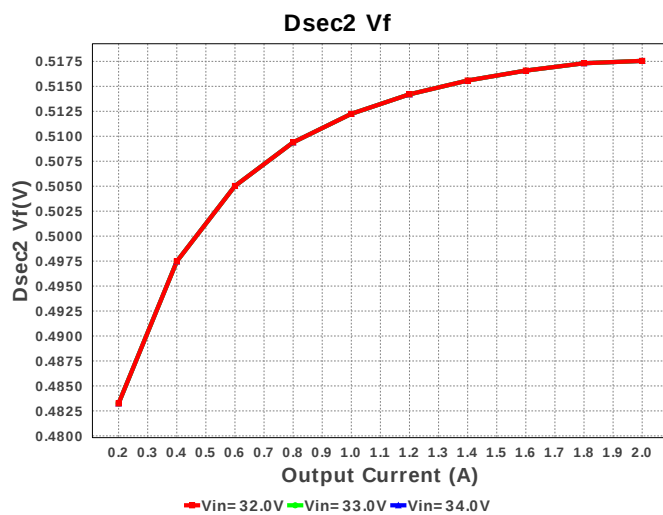
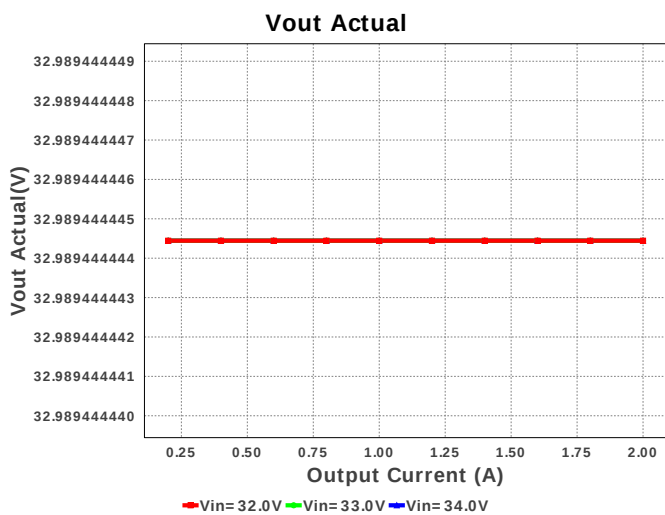
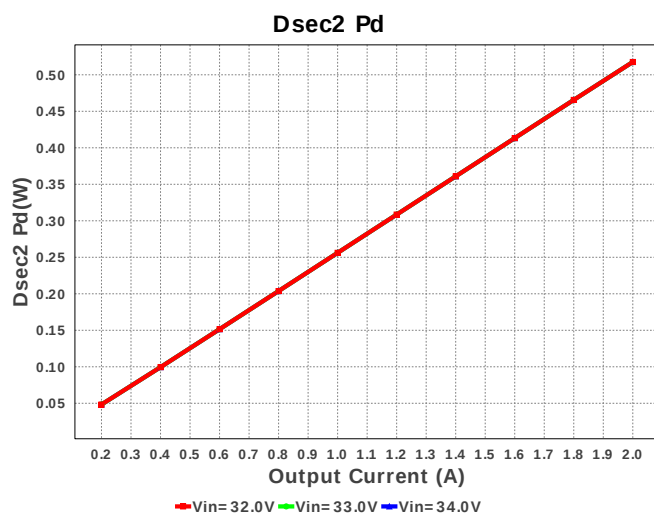
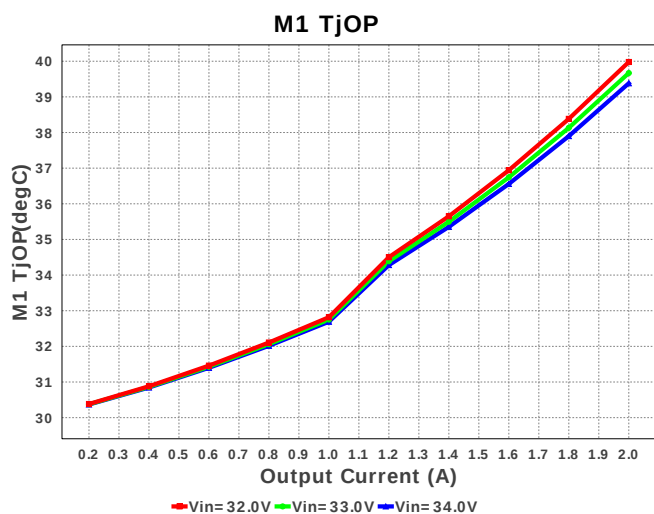
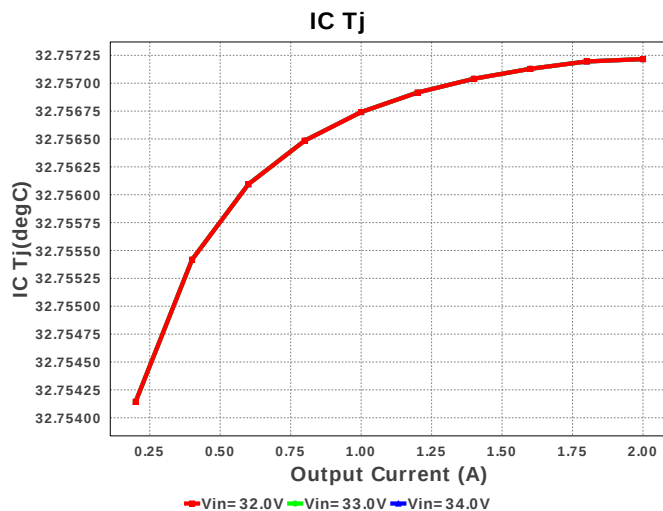
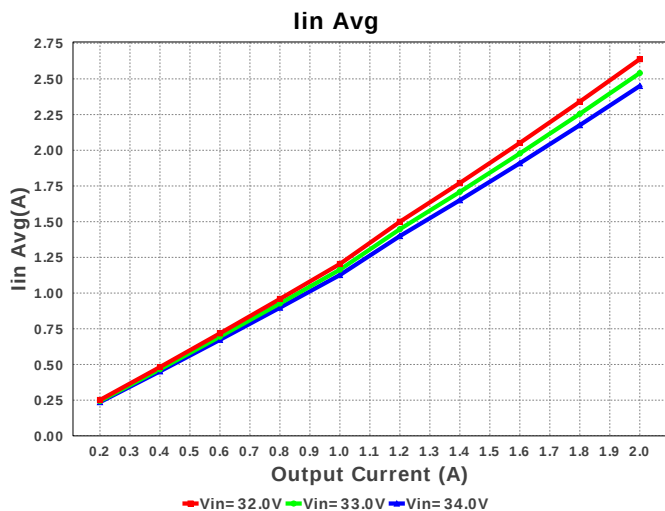
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Cout1	Panasonic	EEV-FK1K471M Series= FK	Cap= 470.0 uF ESR= 153.0 mOhm VDC= 80.0 V IRMS= 917.0 mA	3	\$0.81	 SM_RADIAL_K16 483 mm ²
9.	Cout2	Panasonic	EEHZA1K330P Series= ?	Cap= 33.0 uF ESR= 36.0 mOhm VDC= 80.0 V IRMS= 1.7 A	5	NA	 SM_RADIAL_10BMM 160 mm ²
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 mm ²
11.	Csc	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
12.	Csnub	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
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.	Cvdd	MuRata	GRM188R71C104KA01D Series= X7R	Cap= 100.0 nF ESR= 30.0 mOhm VDC= 16.0 V IRMS= 1.7 A	1	\$0.01	 0603 5 mm ²
15.	D12	Diodes Inc.	MMSZ5248B-7-F	Zener	1	\$0.04	 SOD-123 13 mm ²
16.	D21	Diodes Inc.	B260A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	\$0.09	 SMA 37 mm ²
17.	Daux	NXP Semiconductor	BAS316,115	VF@Io= 1.4 V VRRM= 100.0 V	1	\$0.02	 SOD-323 9 mm ²
18.	Dsec	ON Semiconductor	MBRB40250TG	VF@Io= 860.0 mV VRRM= 250.0 V	1	\$0.94	 DDPAK 210 mm ²
19.	Dsec2	ON Semiconductor	MBRB40250TG	VF@Io= 860.0 mV VRRM= 250.0 V	1	\$0.94	 DDPAK 210 mm ²
20.	Dsnub	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm ²
21.	Dz	Diodes Inc.	MMSZ5250B-7-F	Zener	1	\$0.03	 SOD-123 13 mm ²

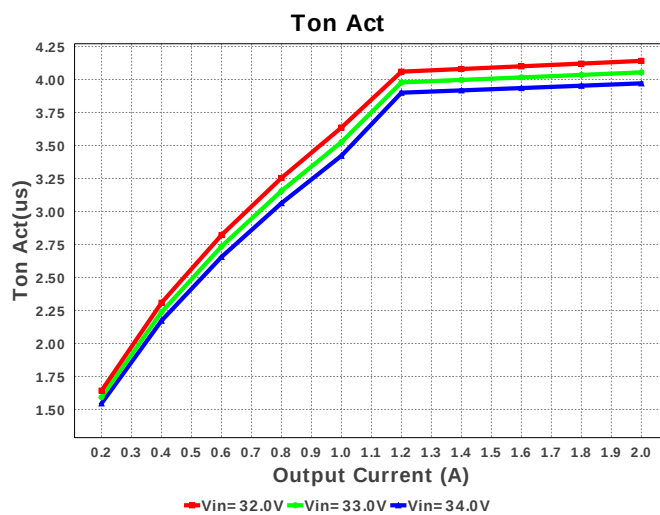
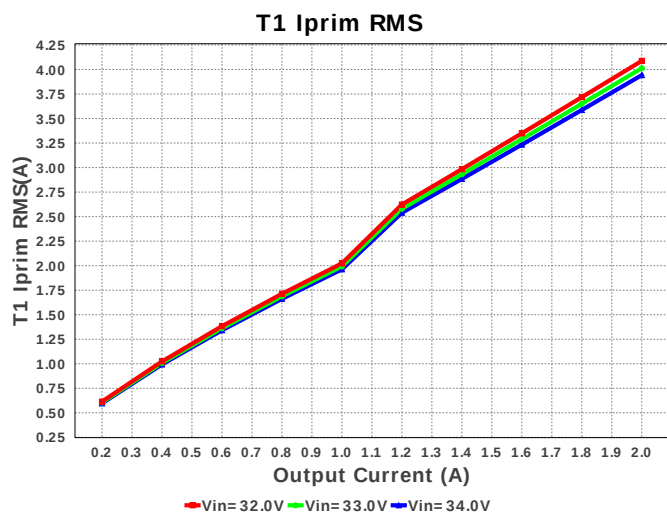
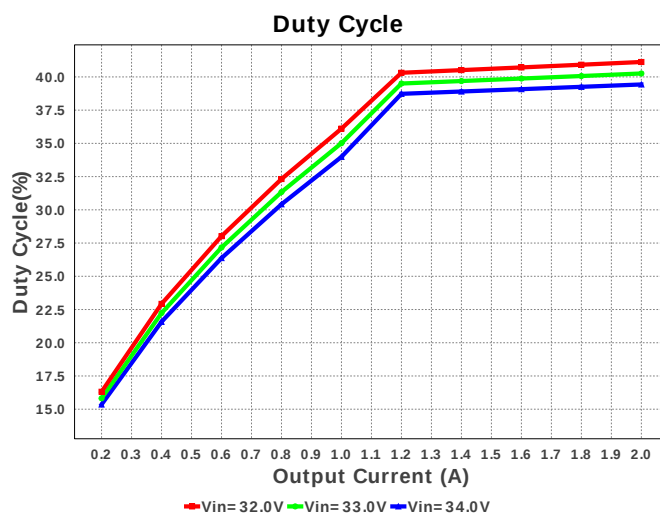
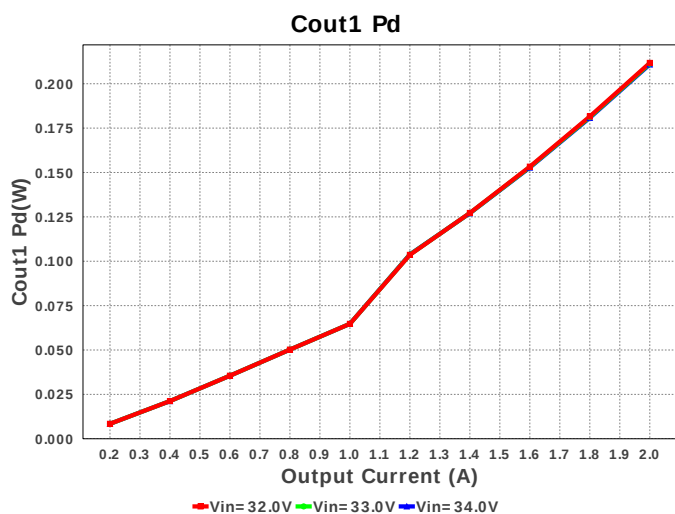
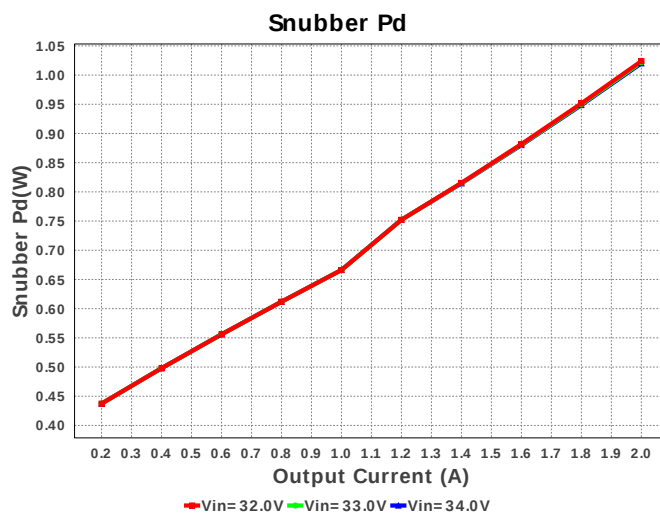
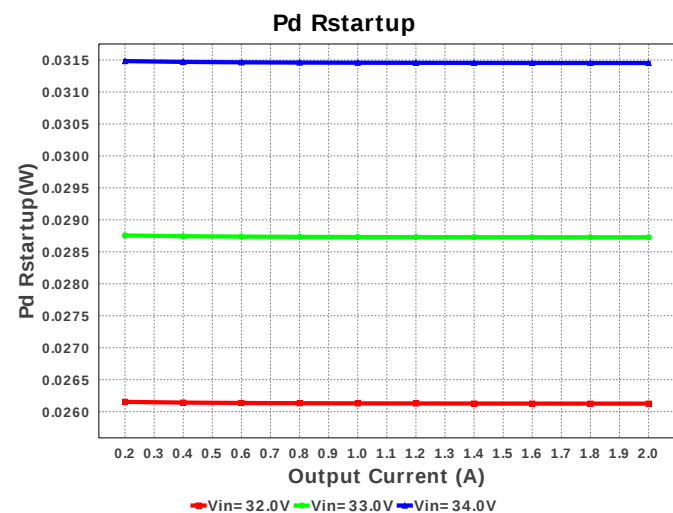
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
22.	L2	Coilcraft	SER1360-182KLB	L= 1.8 µH DCR= 2.4 mOhm	1	\$0.72	 SER1360 225 mm ²
23.	M1	Texas Instruments	CSD19533Q5A	VdsMax= 100.0 V IdsMax= 75.0 Amps	1	\$0.83	 TRANS_NexFET_Q5A 55 mm ²
24.	O1	Vishay-Semiconductor	TCMT1107	Optocoupler	1	\$0.21	 SOP-4 44 mm ²
25.	Q1	ON Semiconductor	BC846BLT1G	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm ²
26.	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
27.	R12	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
28.	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
29.	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
30.	R22	Vishay-Dale	CRCW04022M37FKED Series= CRCW..e3	Res= 2.37 MOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
31.	Raux	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
32.	Rbias	Panasonic	ERJ-6ENF1372V Series= ERJ-6E	Res= 13.7 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
33.	Rcs	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
34.	Rdrv	Vishay-Dale	CRCW04025R36FKED Series= CRCW..e3	Res= 5.36 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
35.	Rfbb	Yageo America	RC0603FR-072K7L Series= ?	Res= 2.7 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
36.	Rfbt	Yageo America	RC0603FR-0733KL Series= ?	Res= 33.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
37.	Rled	Vishay-Dale	CRCW040212K1FKED Series= CRCW..e3	Res= 12.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
38.	Rsc	Vishay-Dale	CRCW040212K7FKED Series= CRCW..e3	Res= 12.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
39.	Rsns	CUSTOM	CUSTOM Series= ?	Res= 74.498 mOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm ²
40.	Rsnub	Vishay-Bcomponents	PR02000201001JR500 Series= ?	Res= 1000.0 Ohm Power= 2.0 W Tolerance= 5.0%	1	\$0.05	PR02 113 mm ²

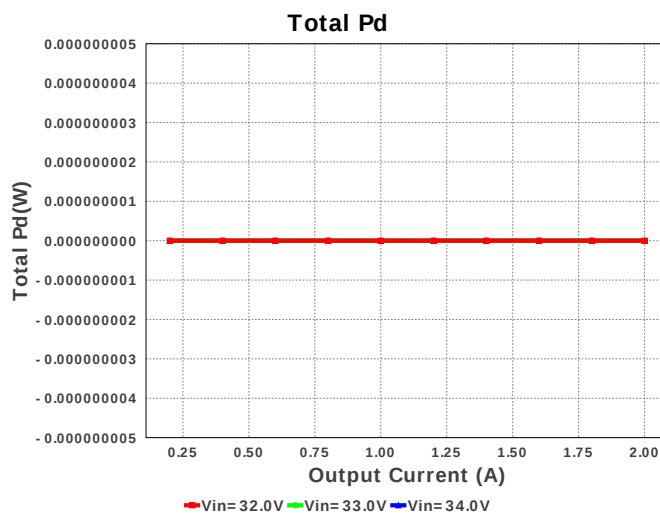
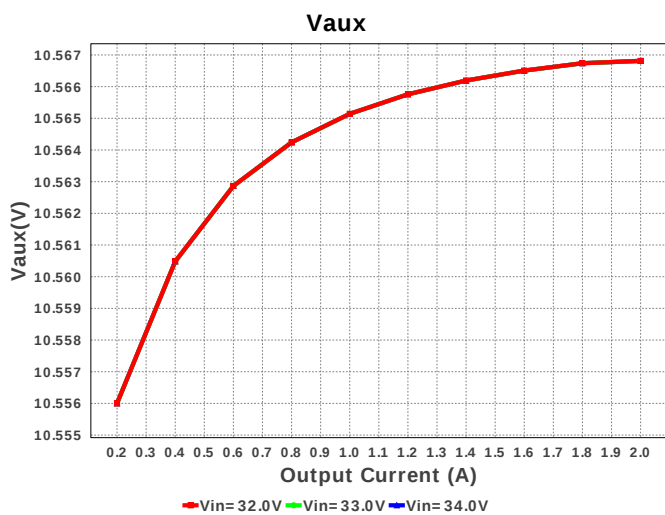
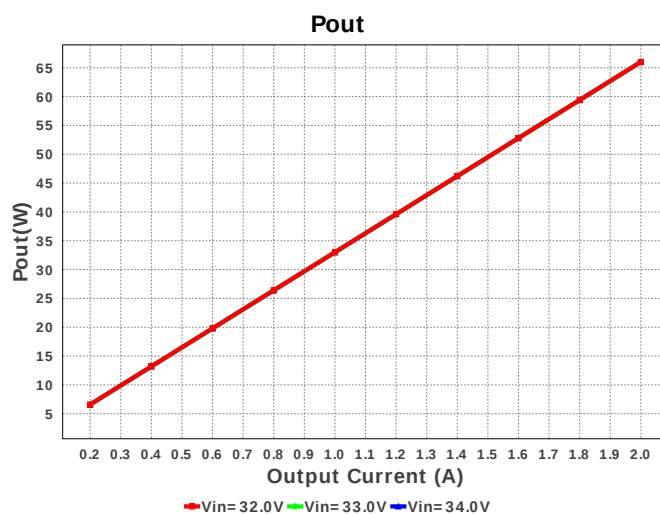
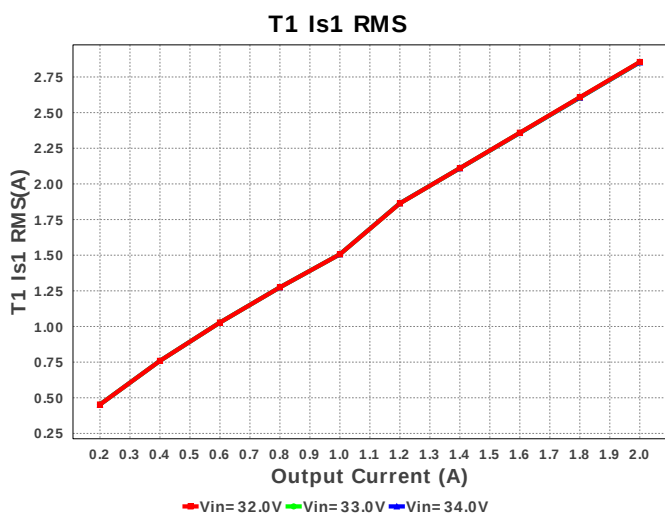
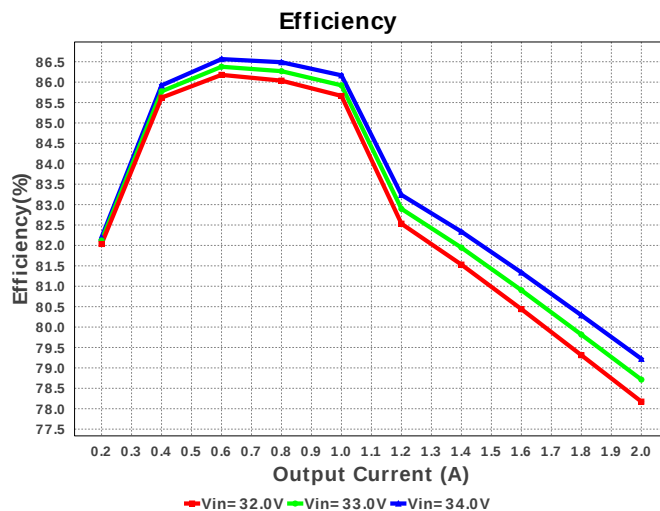
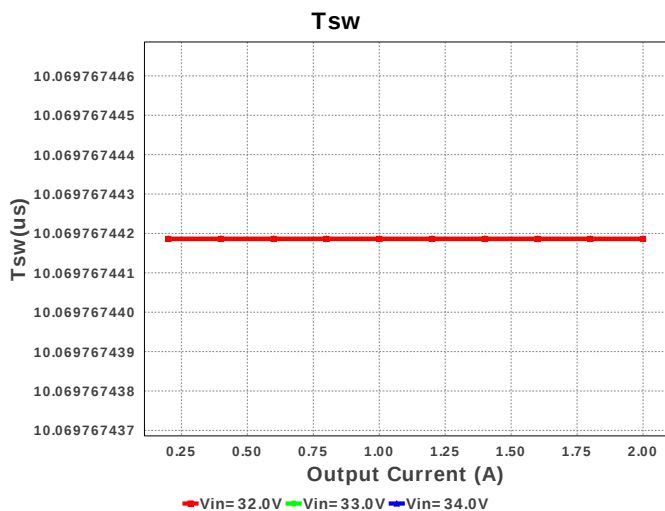
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
41.	Rstartup1	Panasonic	ERJ-8ENF3242V Series= ERJ-8E	Res= 32.4 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
42.	Rstartup2	Panasonic	ERJ-8ENF3242V Series= ERJ-8E	Res= 32.4 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
43.	Rt	Vishay-Dale	CRCW04028K66FKED Series= CRCW..e3	Res= 8.66 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
44.	Rz	Vishay Draloric	CRCW25124K02FKEGHP Series= ?	Res= 4.02 kOhm Power= 1.5 W Tolerance= 1.0%	1	\$0.44	 2512 43 mm ²
45.	T1	CUSTOM	CUSTOM	Lp= 19.953 µH Rp= 870.0 mOhm Leakage_L= 399.062 nH Ns1toNp= 1.713 Rs1= 8.6 mOhms Ns2toNp= 0.54 Rs2= 700.0 µOhms	1	NA	CUSTOM 0 mm ²
46.	U1	Texas Instruments	UCC28C41DR	Switcher	1	\$0.75	 D0008A 57 mm ²
47.	VR	Texas Instruments	TL431AIDBVR	Voltage References	1	\$0.07	 R-PDSO-G3 16 mm ²

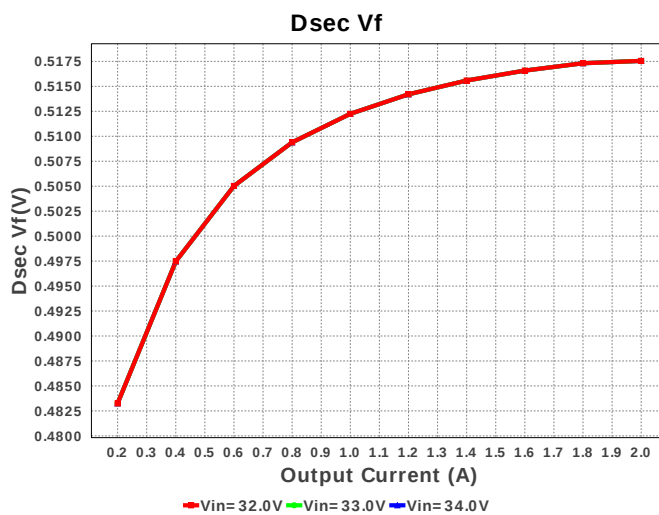
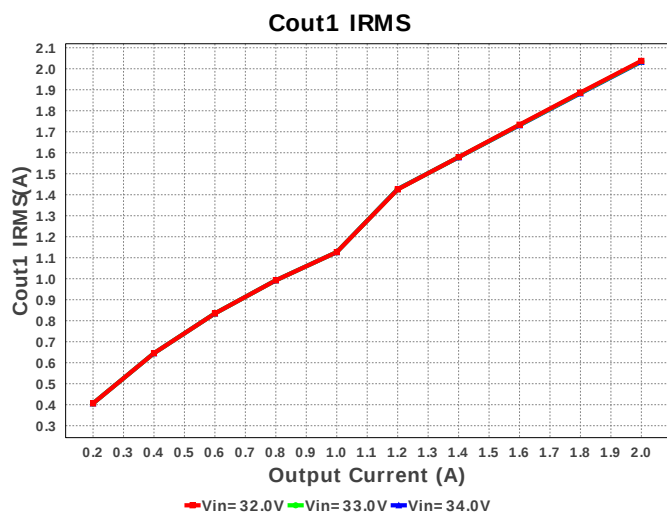
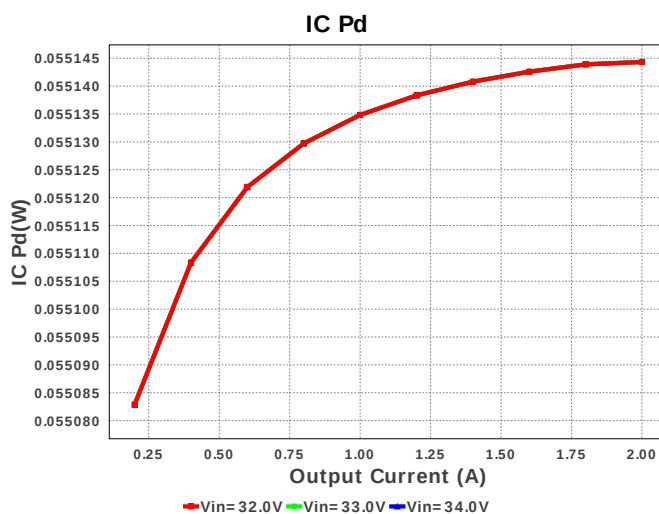
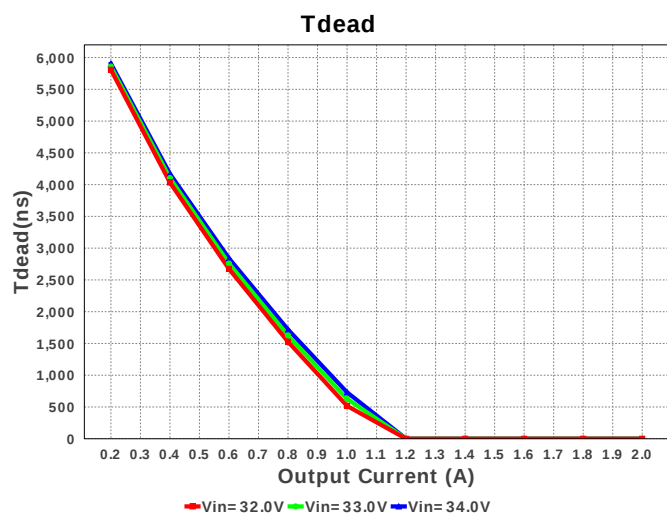
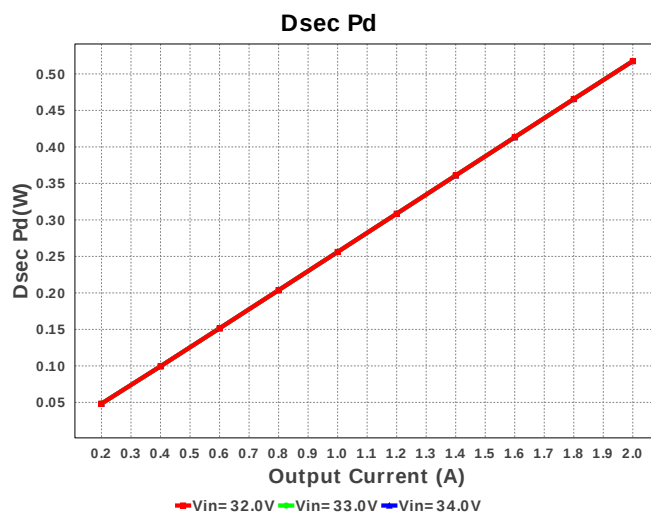
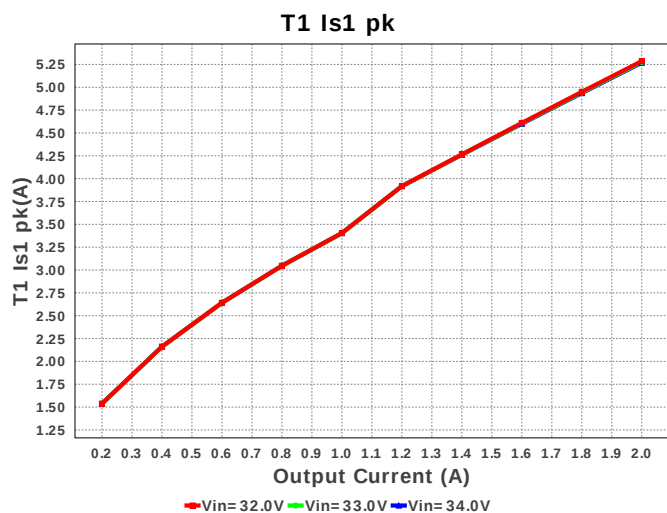


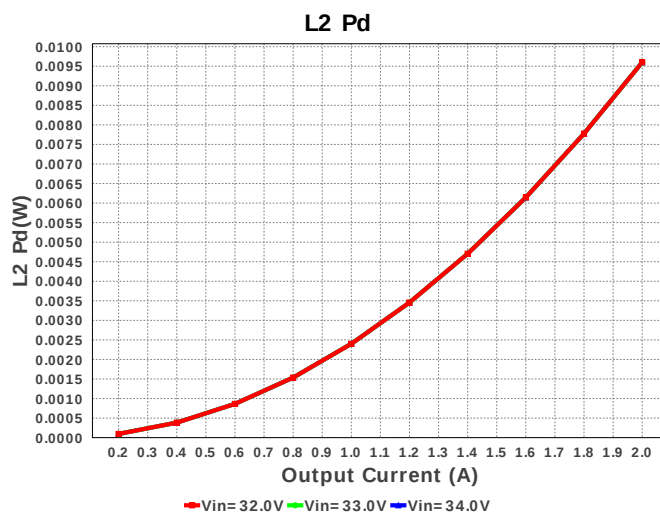
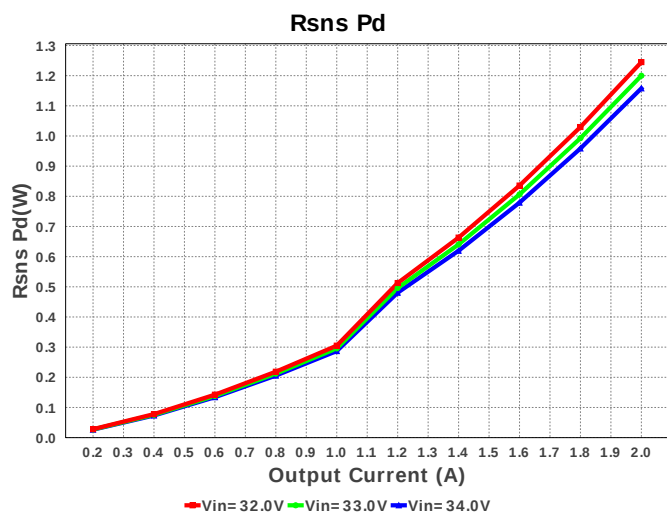
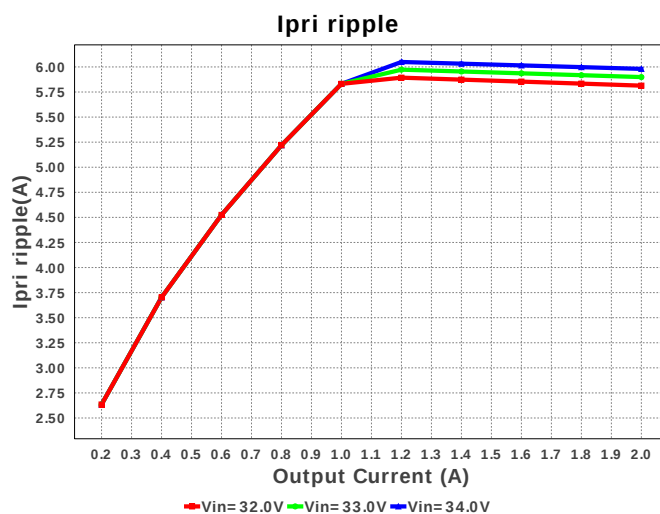
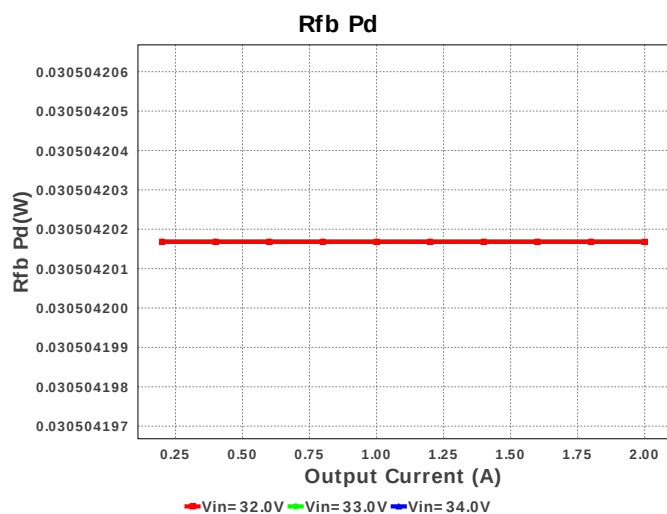
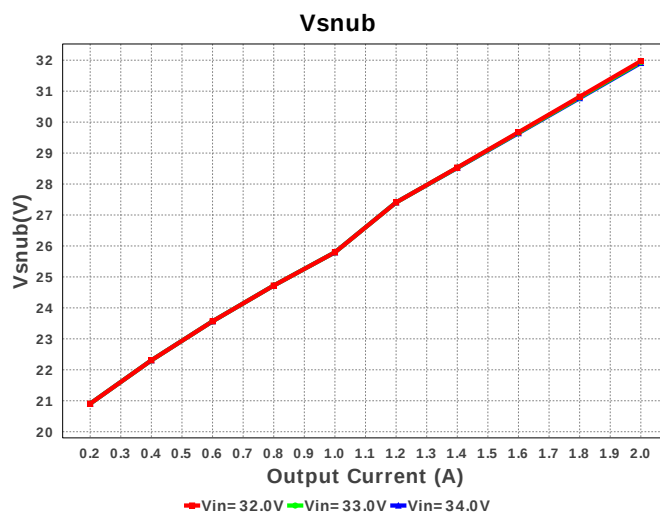
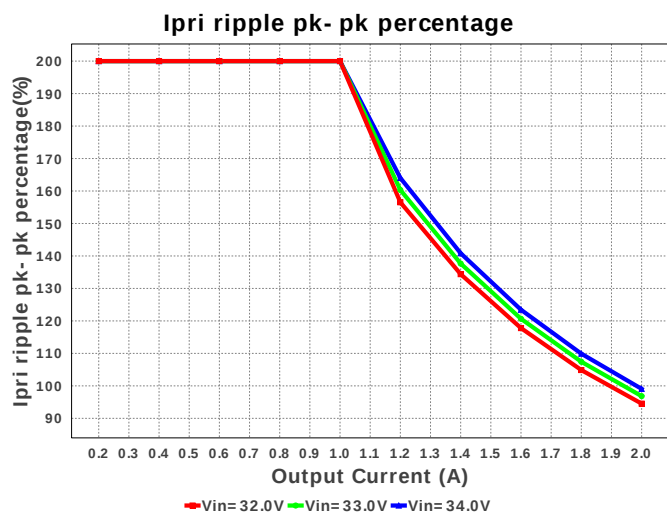


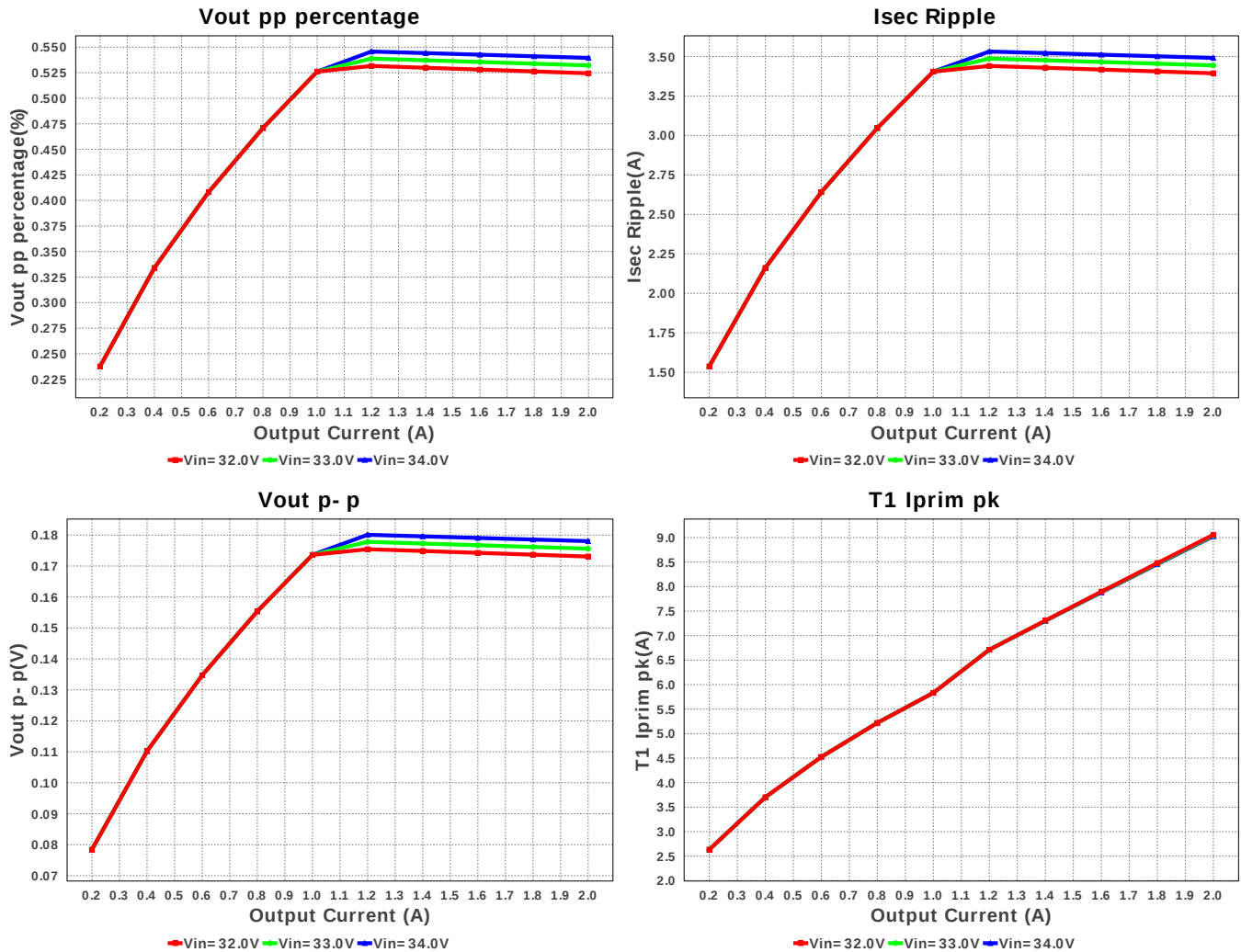












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	2.038 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	2.638 A	Current	Average input current
3.	Iout_DCM	1.195 A	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	2.529 A	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	5.813 A	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	94.534 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	3.393 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	4.088 A	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	9.056 A	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	2.855 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	5.286 A	Current	Transformer Secondary1 Peak Current
12.	BOM Count	53	General	Total Design BOM count
13.	Daux trr	4.0 ns	General	Auxiliary Diode Reverse Recovery Time
14.	Dsec Vf	517.55 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	517.55 mV	General	Effective Forward Voltage Drop at the Operating Current
17.	Dsnub trr	0.0 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	3.679 k mm ²	General	Total Foot Print Area of BOM components
19.	Frequency	99.307 kHz	General	Switching frequency
20.	Pout	66.0 W	General	Total output power
21.	Tdead	0.0 ns	General	Approximate Dead Time of the Regulator
22.	Toff	5.61 us	General	Approximate Converter Off Time
23.	Ton Act	4.141 us	General	Approximate Converter On Time
24.	Total BOM	\$0.0	General	Total BOM Cost
25.	Tsw	10.07 us	General	Switching Time Period
26.	Vaux	10.567 V	General	Auxiliary Voltage
27.	Vsnub	31.971 V	General	Voltage Across the Snubber
28.	Vout Actual	32.989 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
29.	Vout OP	33.0 V	Op_Point	Operational Output Voltage

#	Name	Value	Category	Description
30.	Duty Cycle	41.123 %	Op_point	Duty cycle
31.	Efficiency	78.174 %	Op_point	Steady state efficiency
32.	IC Tj	32.757 degC	Op_point	IC junction temperature
33.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
34.	IOUT_OP	2.0 A	Op_point	Iout operating point
35.	M1 TjOP	39.979 degC	Op_point	M1 MOSFET junction temperature
36.	Vout p-p	173.066 mV	Op_point	Peak-to-peak output ripple voltage
37.	Cin Pd	26.044 mW	Power	Input capacitor power dissipation
38.	Cout1 Pd	211.735 mW	Power	Output capacitor1 power dissipation
39.	Dsec Pd	517.55 mW	Power	Secondary Diode Power Dissipation
40.	Dsec2 Pd	517.55 mW	Power	Secondary Diode Power Dissipation
41.	IC Pd	55.144 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	199.577 mW	Power	M1 MOSFET total power dissipation
44.	Paux	18.792 mW	Power	Power Dissipation in Raux and Daux
45.	Pd Rstartup	26.126 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
46.	Rdrv Pd	38.535 μ W	Power	Power Dissipation in Gate Drive Resistor
47.	Rfb Pd	30.504 mW	Power	Rfb Power Dissipation
48.	Rsns Pd	1.245 W	Power	Current Limit Sense Resistor Power Dissipation
49.	Snubber Pd	1.024 W	Power	Snubber Power Dissipation
50.	T1 Pd	29.216 W	Power	Estimated Losses in Transformer
51.	Total Pd	0.0 W	Power	Total Power Dissipation
52.	Vout Tolerance	2.194 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
53.	Vout pp percentage	524.441 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	33.0	Output Voltage
8.	Vout1	33.0	Output Voltage #1
9.	Vout2	7.0	Output Voltage #2
10.	Vout3	13.0	Output Voltage #3
11.	base_pn	UCC28C41	Texas Instruments Base Part Number
12.	source	DC	Input Source Type
13.	ta	30.0	Ambient temperature

Design Assistance

1. UCC28C41 Product Folder : <http://www.ti.com/product/UCC28C41> : contains the data sheet and other resources.

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