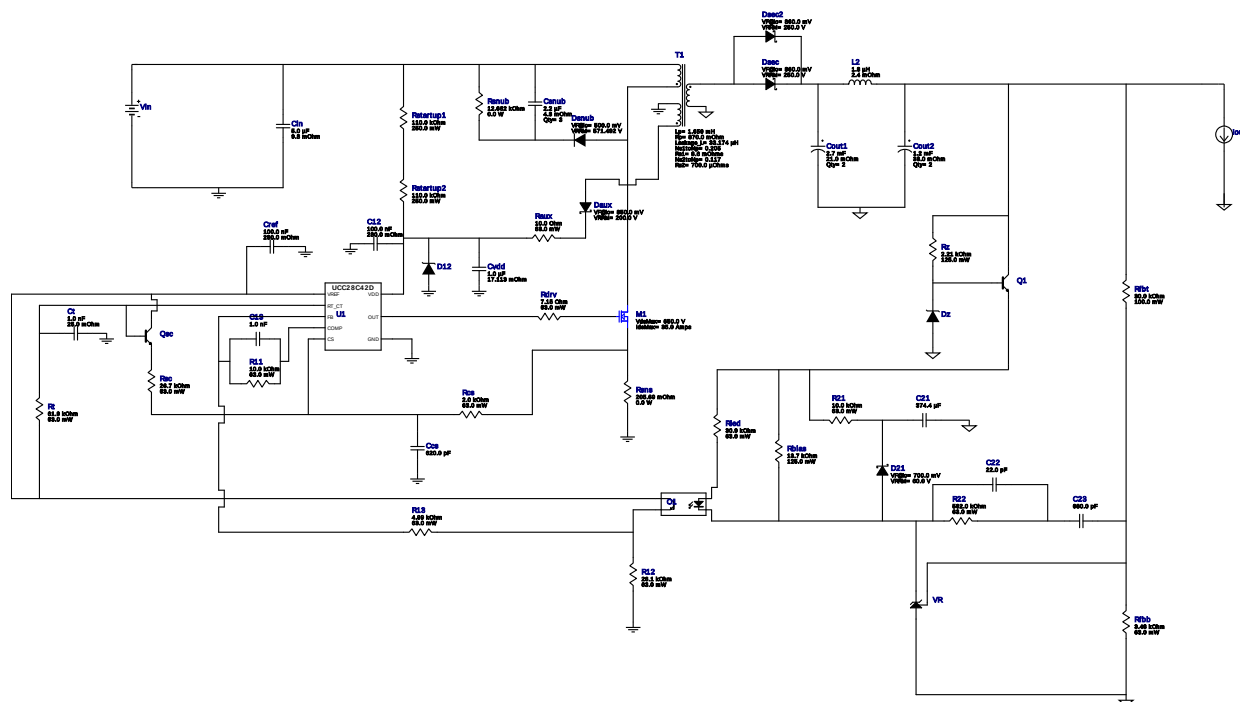




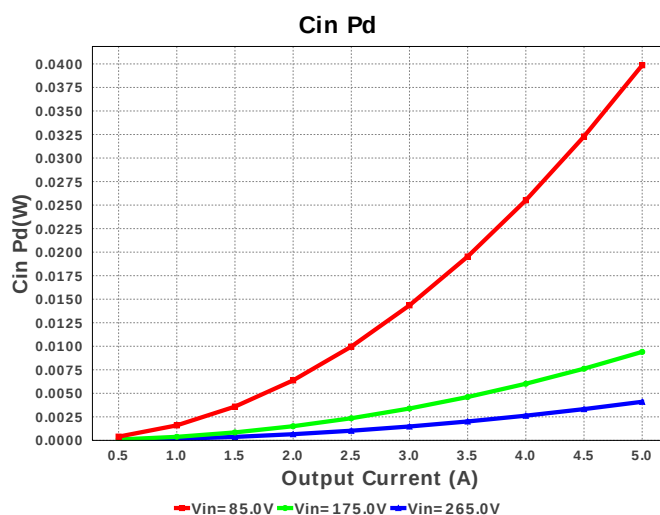
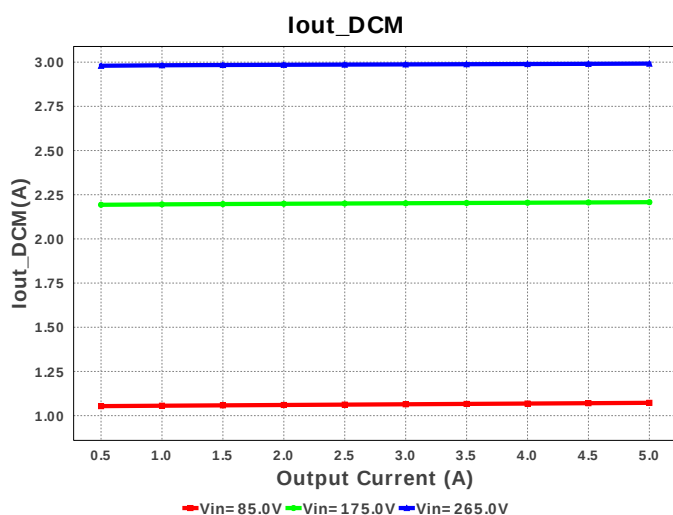
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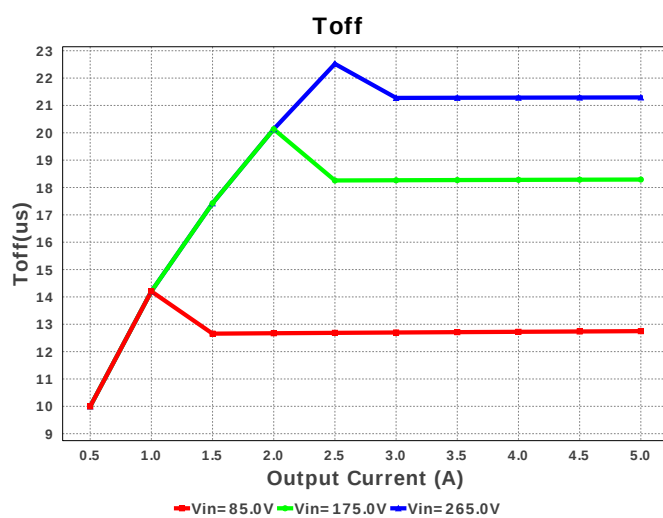
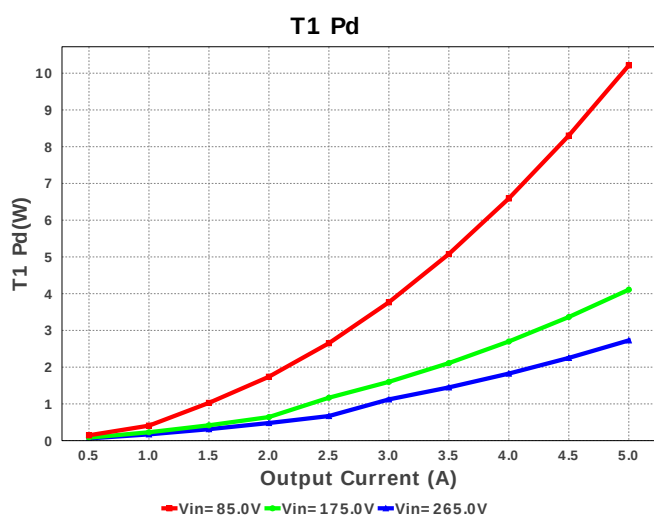
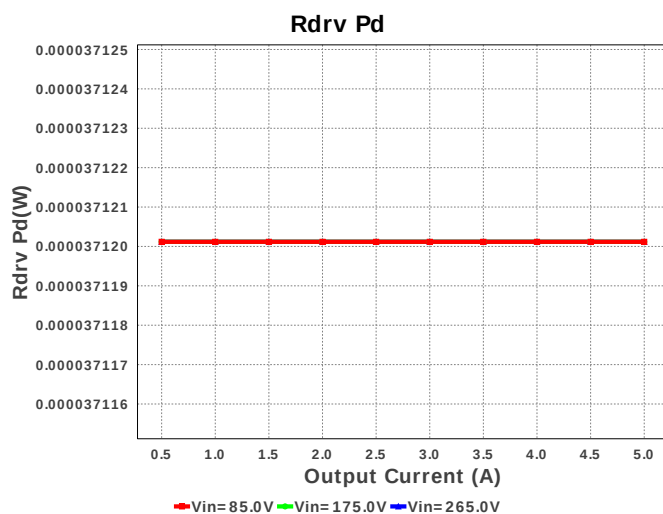
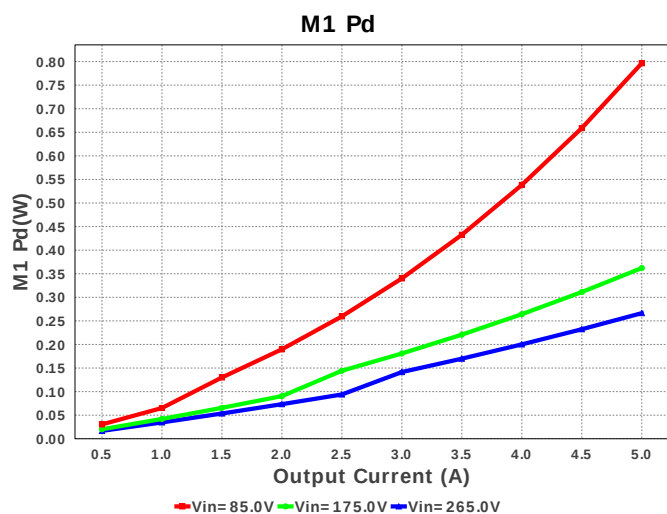
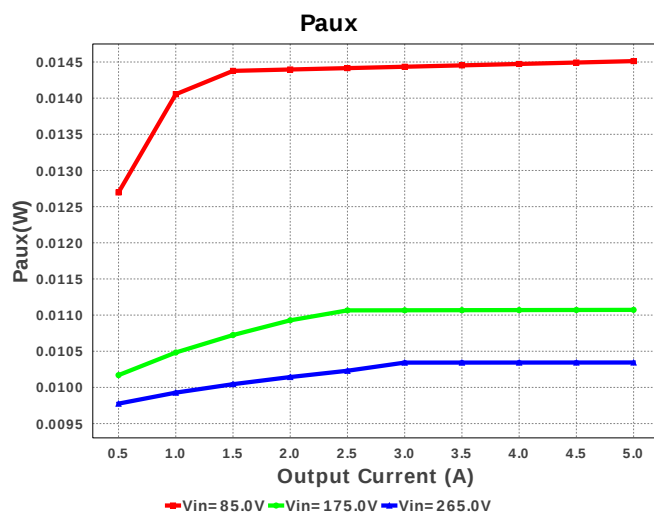
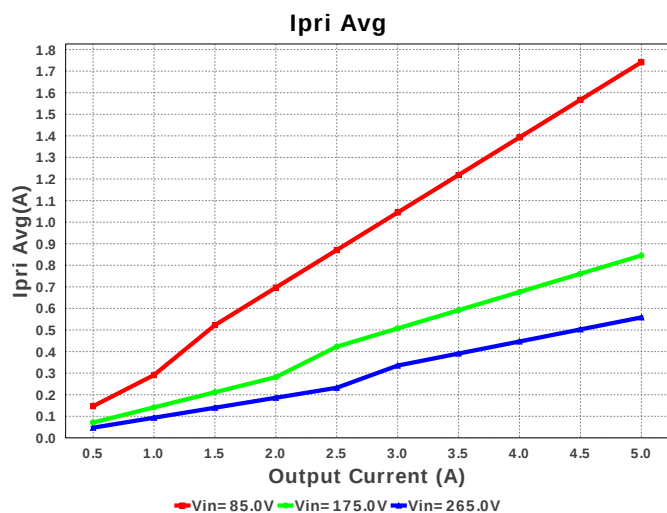
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C12	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	C13	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	C21	CUSTOM	CUSTOM Series= ?	Cap= 374.4 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	CC0805KRX7R9BB681 Series= X7R	Cap= 680.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
6.	Ccs	Samsung Electro-Mechanics	CL21C621JBCNNNC Series= C0G/NP0	Cap= 620.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²

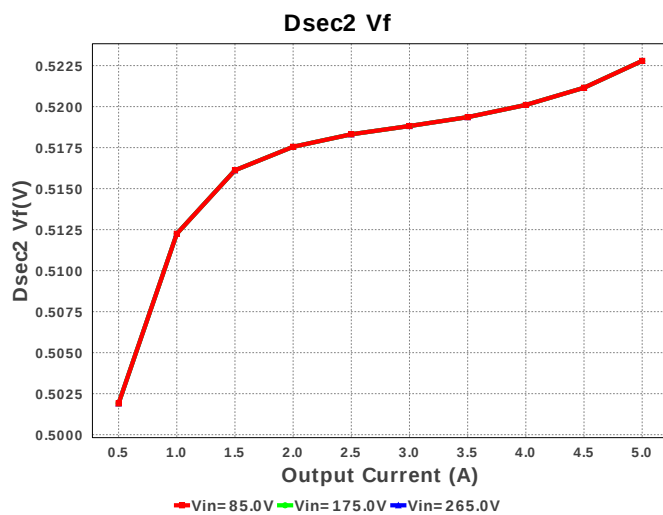
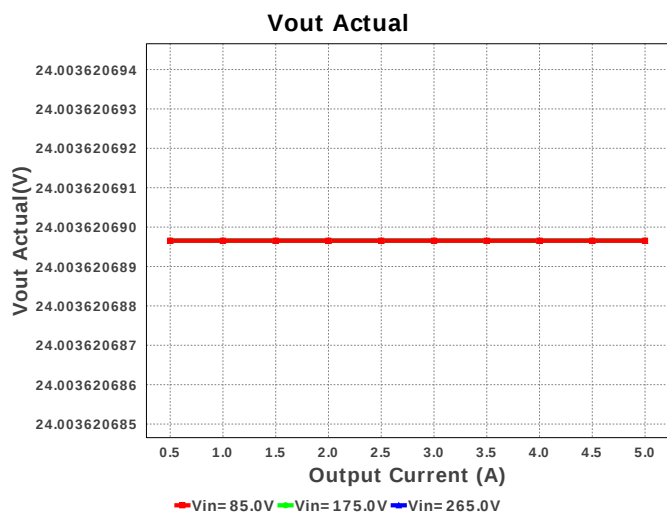
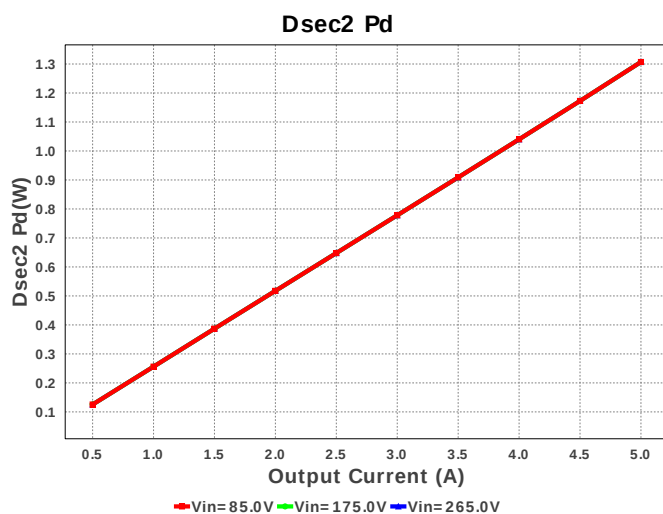
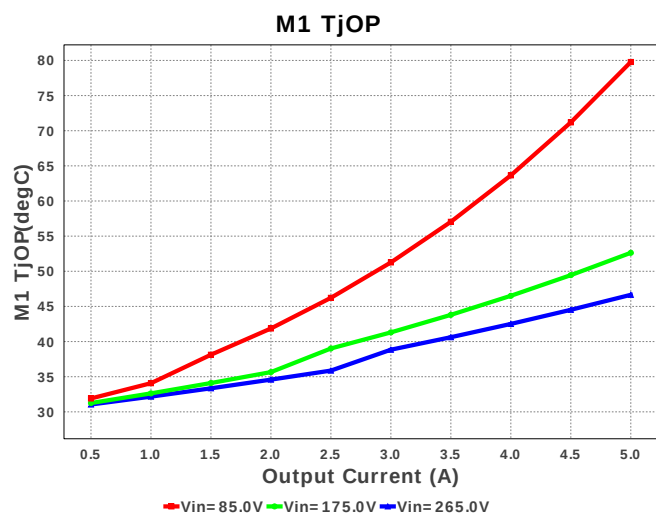
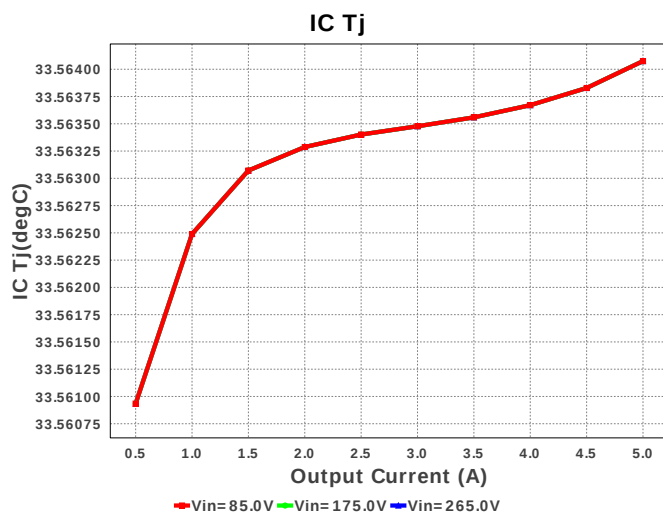
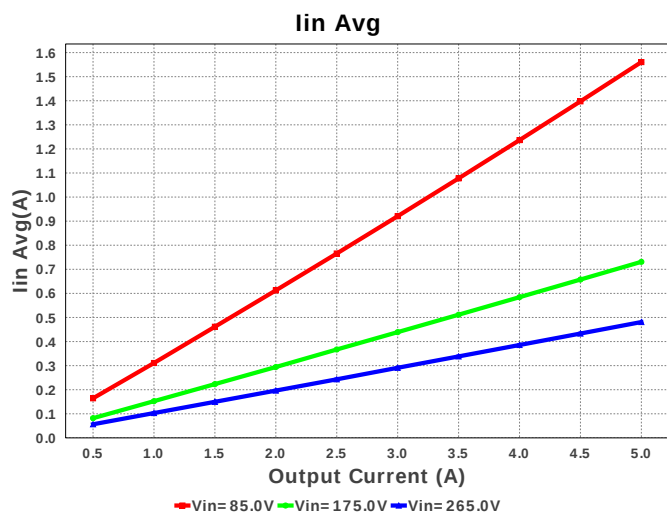
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7.	Cin	TDK	B32774D1505K Series= B32774	Cap= 5.0 uF ESR= 9.8 mOhm VDC= 1.3 kV IRMS= 10.5 A	1	\$3.08	 B32774_3150x2200x3650 804 mm ²
8.	Cout1	TDK	B41605A8278M009 Series= 2385	Cap= 2.7 mF ESR= 21.0 mOhm VDC= 63.0 V IRMS= 5.3 A	2	\$12.37	B41605_2500x4000_9 729 mm ²
9.	Cout2	TDK	B41607A8128M002 Series= 2360	Cap= 1.2 mF ESR= 38.0 mOhm VDC= 63.0 V IRMS= 11.4 A	2	\$4.21	B41607_2500x4000_2 729 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.	Csnub	TDK	C5750X6S2W225K Series= X6S	Cap= 2.2 uF ESR= 4.3 mOhm VDC= 400.0 V IRMS= 0.0 A	3	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.	Cvdd	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.	D12	Diodes Inc.	MMSZ5248B-7-F	Zener	1	\$0.04	 SOD-123 13 mm ²
15.	D21	Diodes Inc.	B260A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	\$0.09	 SMA 37 mm ²
16.	Daux	Diodes Inc.	DFLS1200-7	VF@Io= 850.0 mV VRRM= 200.0 V	1	\$0.21	 PowerDI123 13 mm ²
17.	Dsec	ON Semiconductor	MBRB40250TG	VF@Io= 860.0 mV VRRM= 250.0 V	1	\$0.94	 DDPAK 210 mm ²
18.	Dsec2	ON Semiconductor	MBRB40250TG	VF@Io= 860.0 mV VRRM= 250.0 V	1	\$0.94	 DDPAK 210 mm ²
19.	Dsnub	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 571.492 V	1	NA	CUSTOM 0 mm ²
20.	Dz	Diodes Inc.	MMSZ5250B-7-F	Zener	1	\$0.03	 SOD-123 13 mm ²
21.	L2	Coilcraft	SER1360-182KLB	L= 1.8 uH DCR= 2.4 mOhm	1	\$0.72	 SER1360 225 mm ²

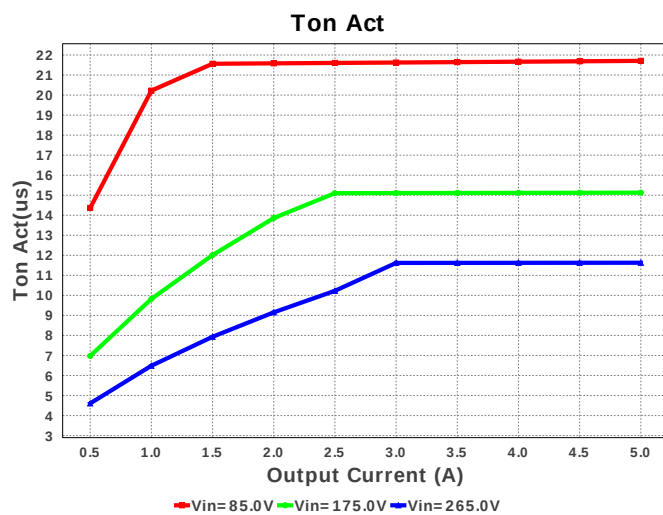
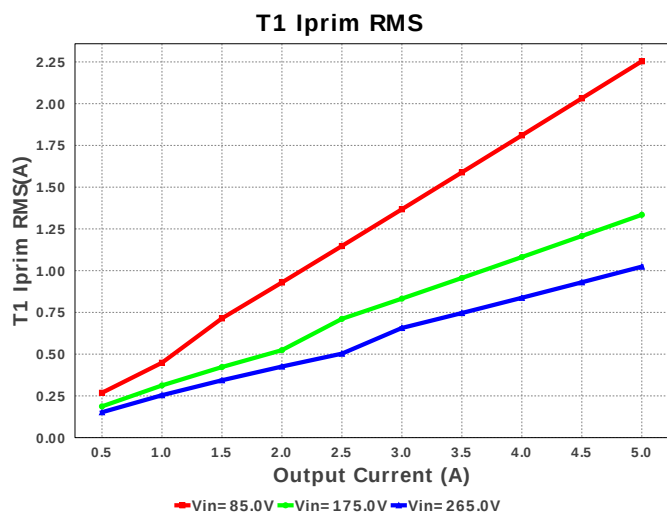
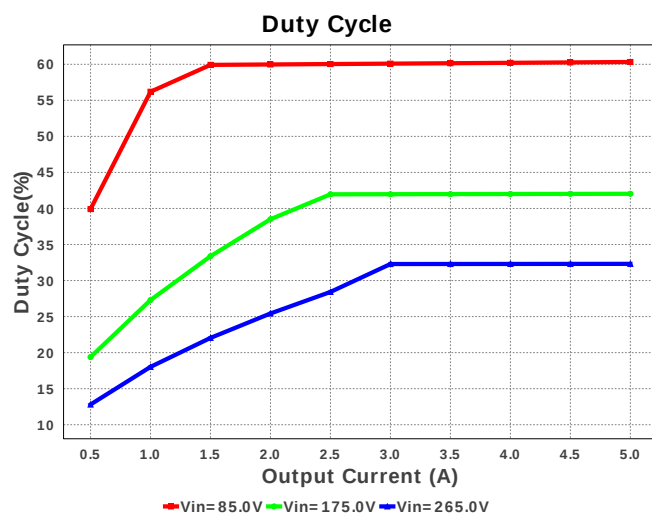
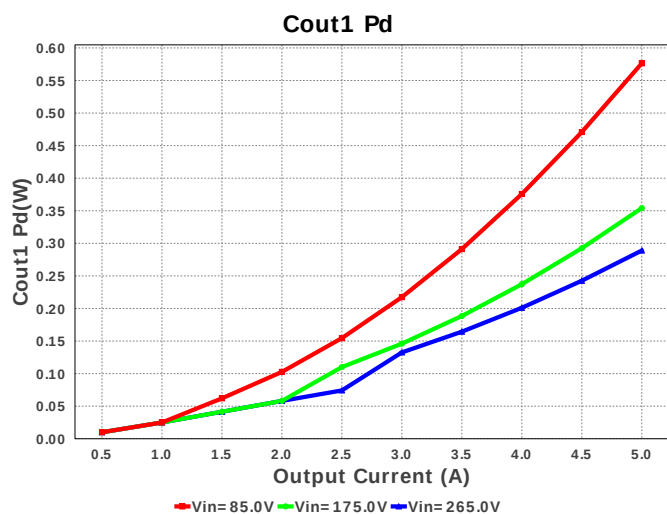
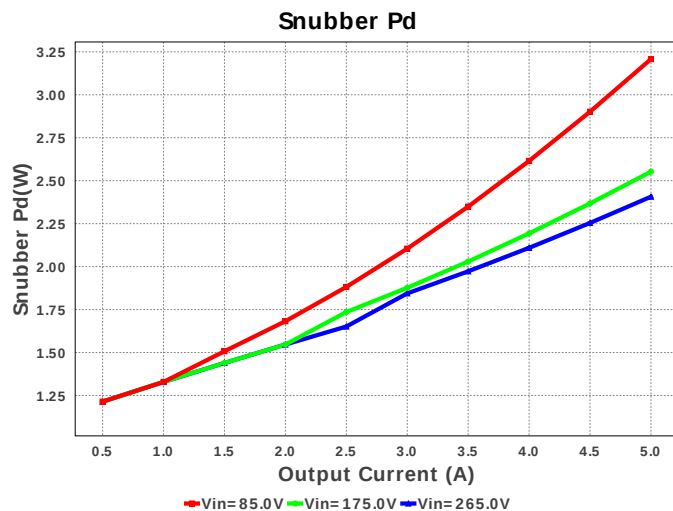
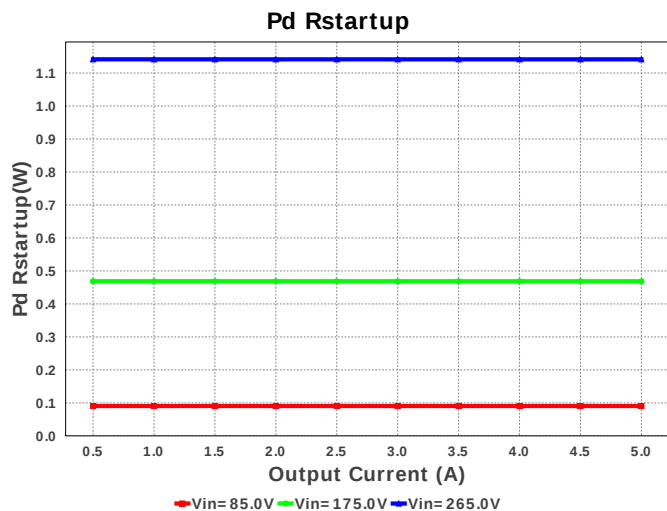
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
22.	M1	STMicroelectronics	STP45N65M5	VdsMax= 650.0 V IdsMax= 35.0 Amps	1	\$3.85	 TO-220AB 397 mm ²
23.	O1	Vishay-Semiconductor	TCMT1107	Optocoupler	1	\$0.21	 SOP-4 44 mm ²
24.	Q1	ON Semiconductor	BC846BLT1G	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm ²
25.	Qsc	STMicroelectronics	2N2222A	Bipolar Transistor	1	NA	 TO-18 57 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	CRCW040226K1FKED Series= CRCW..e3	Res= 26.1 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	CRCW0402562KFKED Series= CRCW..e3	Res= 562.0 kOhm 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	CRCW04027R15FKED Series= CRCW..e3	Res= 7.15 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
35.	Rfbb	Vishay-Dale	CRCW04023K48FKED Series= CRCW..e3	Res= 3.48 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
36.	Rfbt	Yageo America	RC0603FR-0730KL Series= ?	Res= 30.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
37.	Rled	Vishay-Dale	CRCW040230K9FKED Series= CRCW..e3	Res= 30.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
38.	Rsc	Vishay-Dale	CRCW040226K7FKED Series= CRCW..e3	Res= 26.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
39.	Rsns	CUSTOM	CUSTOM Series= ?	Res= 205.69 mOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm ²
40.	Rsnub	CUSTOM	CUSTOM Series= ?	Res= 12.662 kOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm ²
41.	Rstartup1	Panasonic	ERJ-8ENF1103V Series= ERJ-8E	Res= 110.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²

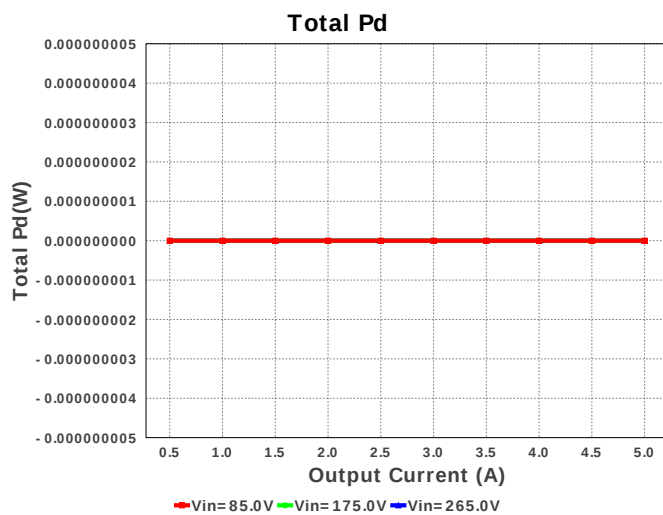
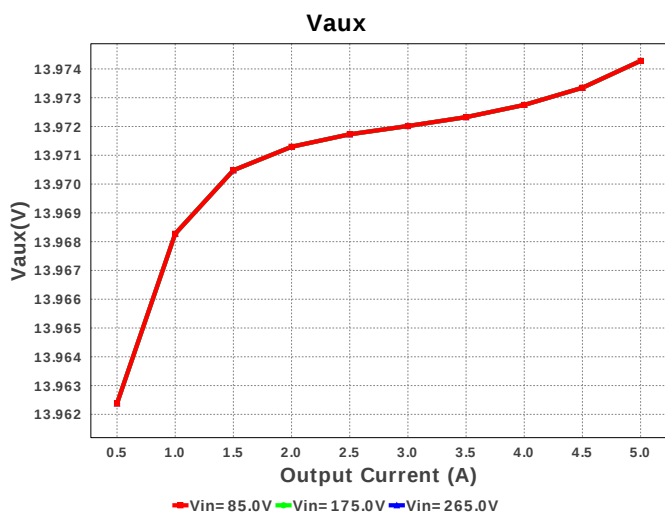
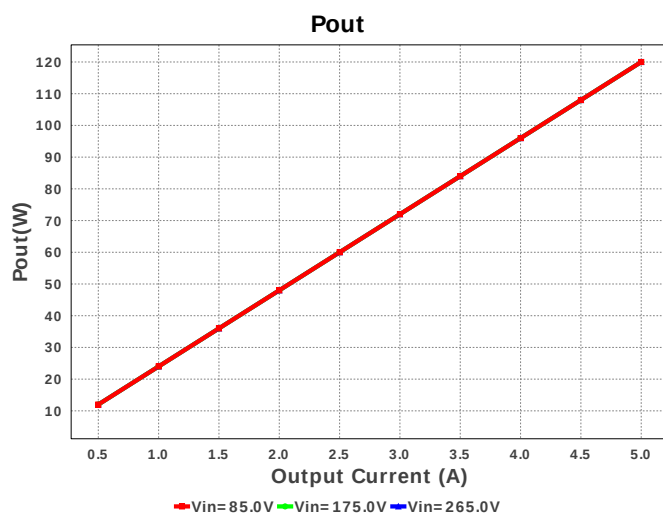
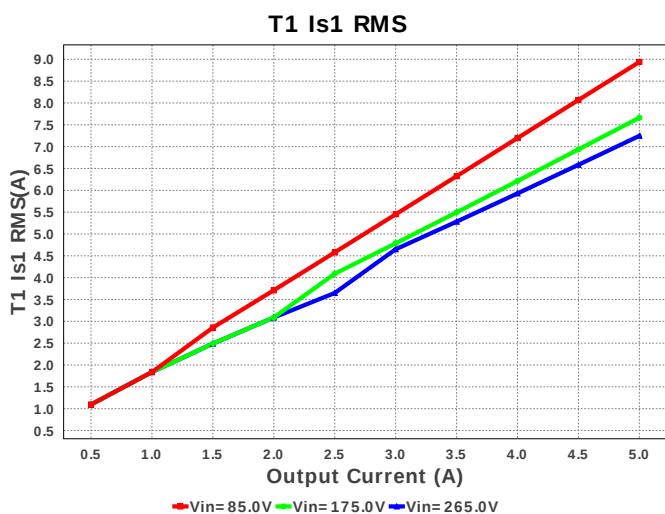
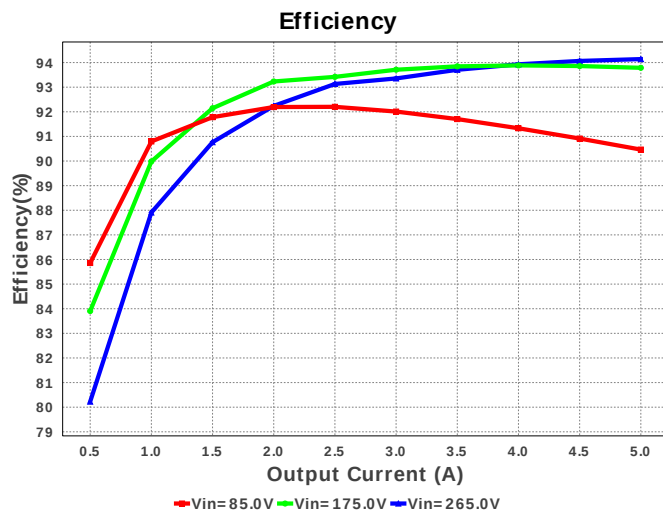
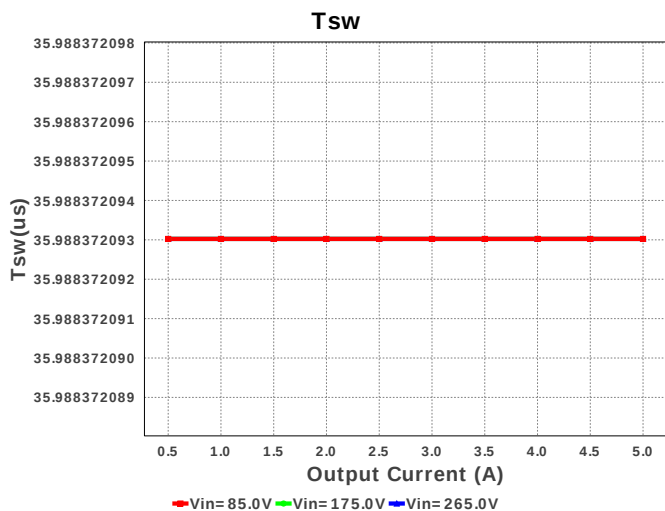
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
42.	Rstartup2	Panasonic	ERJ-8ENF1103V Series= ERJ-8E	Res= 110.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
43.	Rt	Vishay-Dale	CRCW040261K9FKED Series= CRCW...e3	Res= 61.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
44.	Rz	Panasonic	ERJ-6ENF2211V Series= ERJ-6E	Res= 2.21 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
45.	T1	CUSTOM	CUSTOM	Lp= 1.659 mH Rp= 870.0 mOhm Leakage_L= 33.174 μ H Ns1toNp= 0.205 Rs1= 8.6 mOhms Ns2toNp= 0.117 Rs2= 700.0 μ Ohms	1	NA	CUSTOM 0 mm ²
46.	U1	Texas Instruments	UCC28C42DR	Switcher	1	\$0.60	 D0008A 57 mm ²
47.	VR	Texas Instruments	TL431AIDBZR	Voltage References	1	\$0.08	 DBZ0003A 14 mm ²

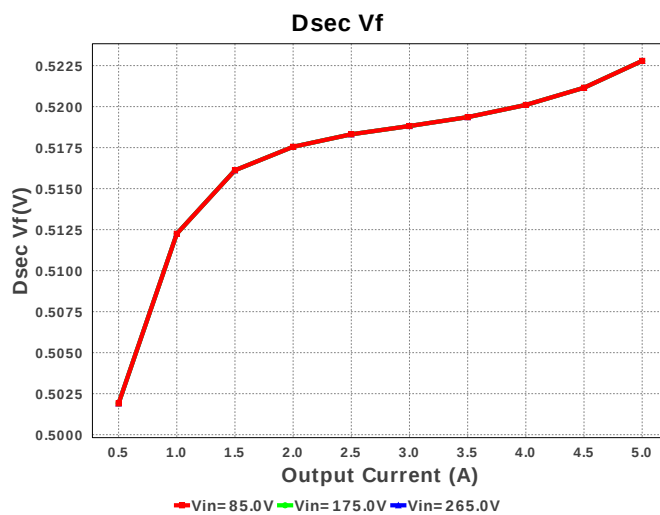
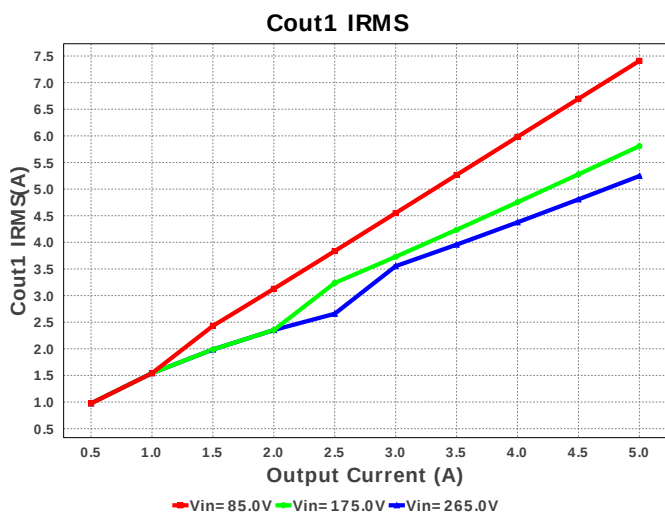
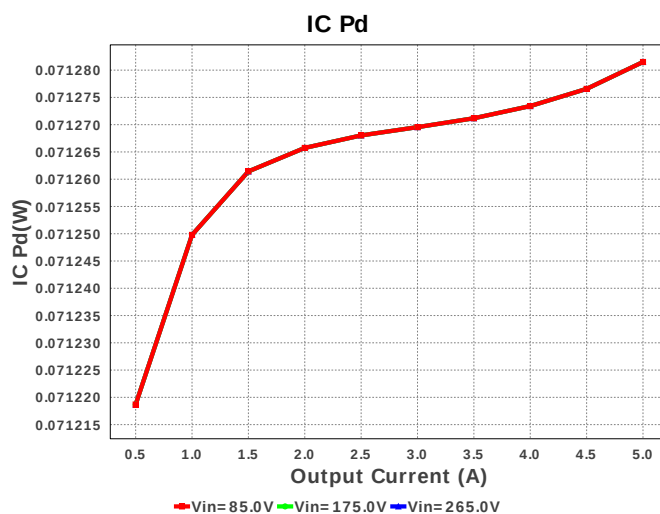
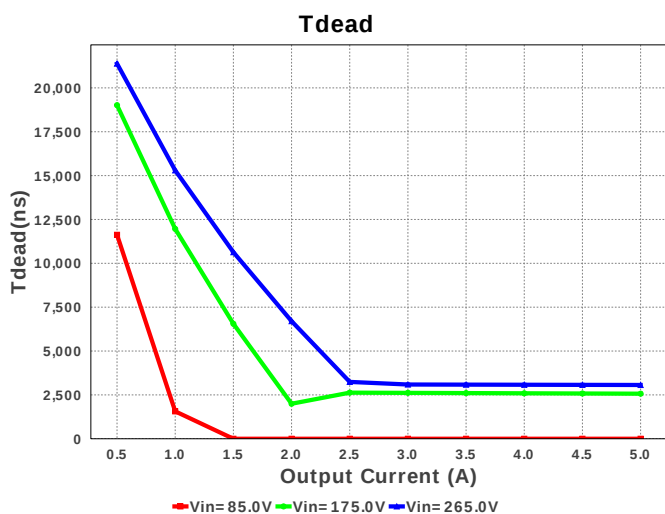
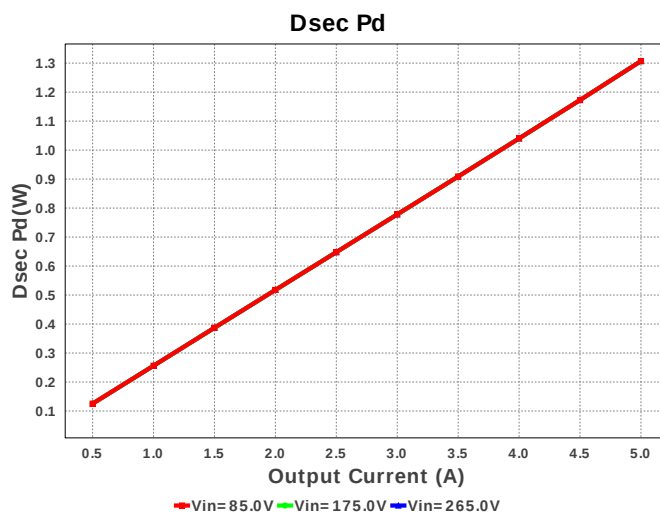
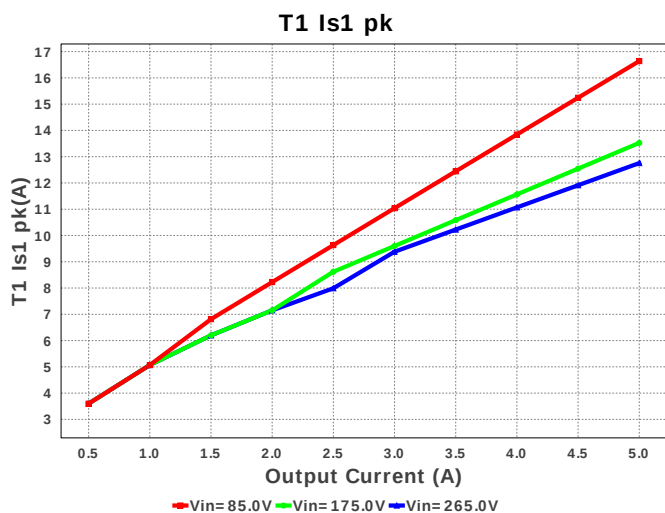


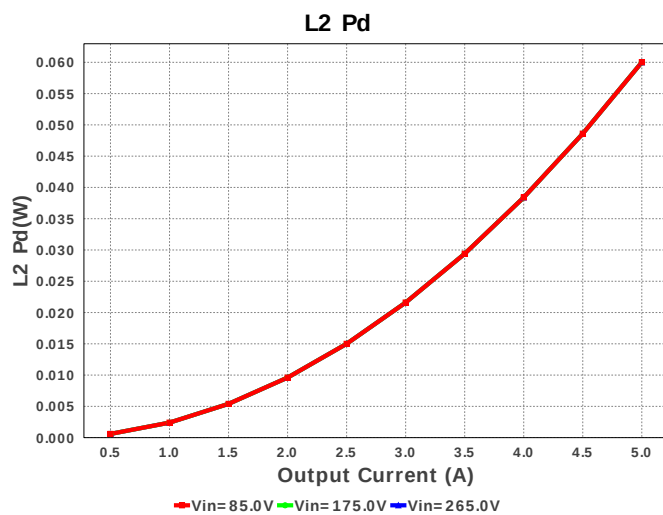
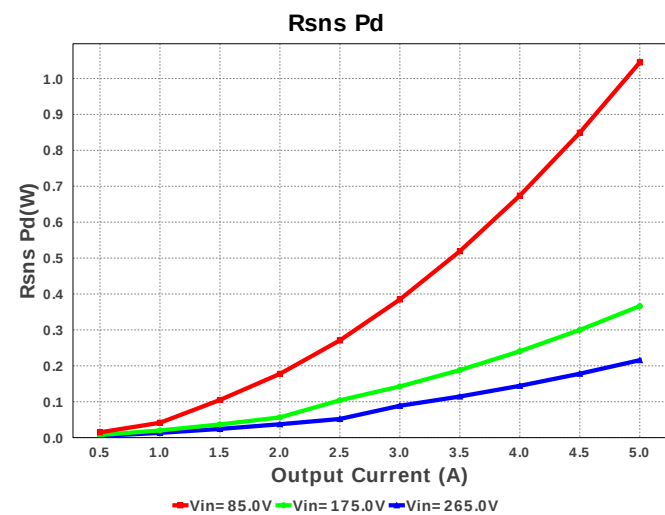
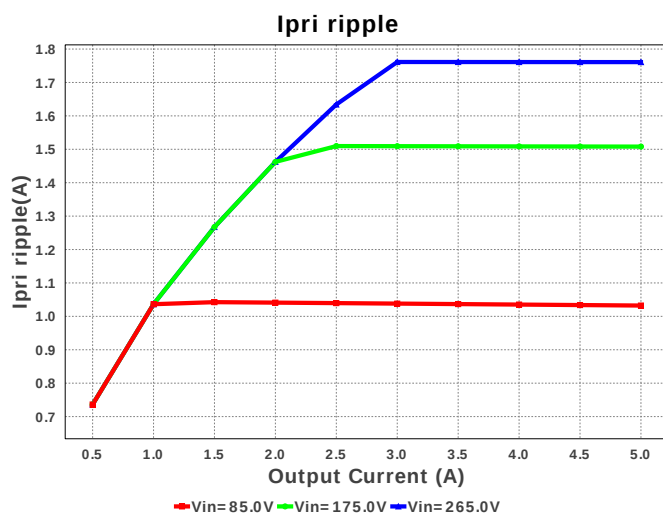
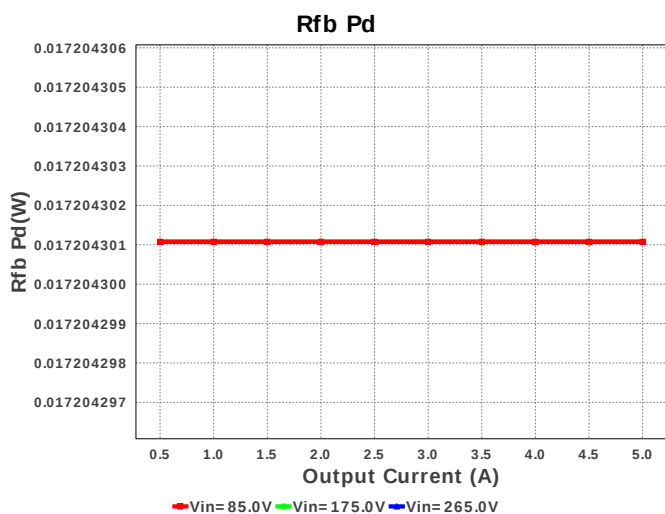
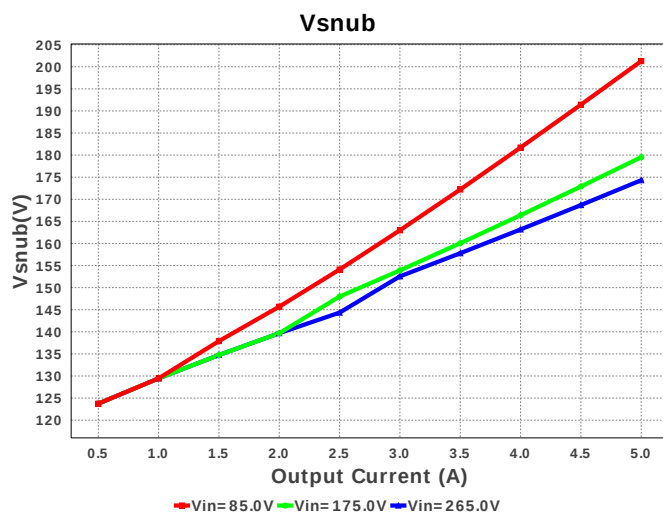
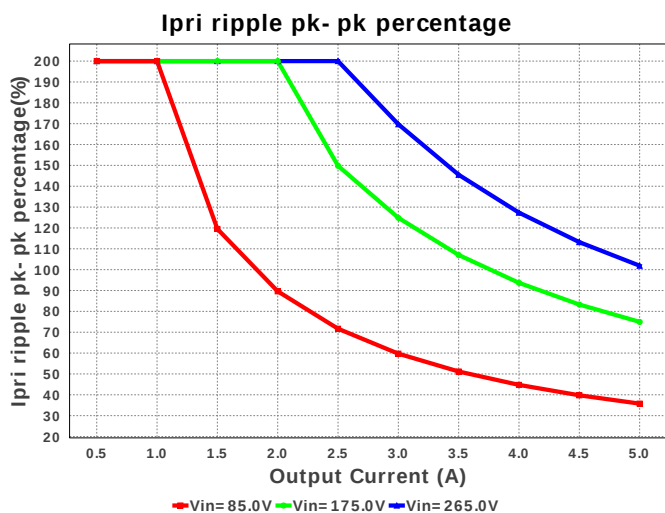


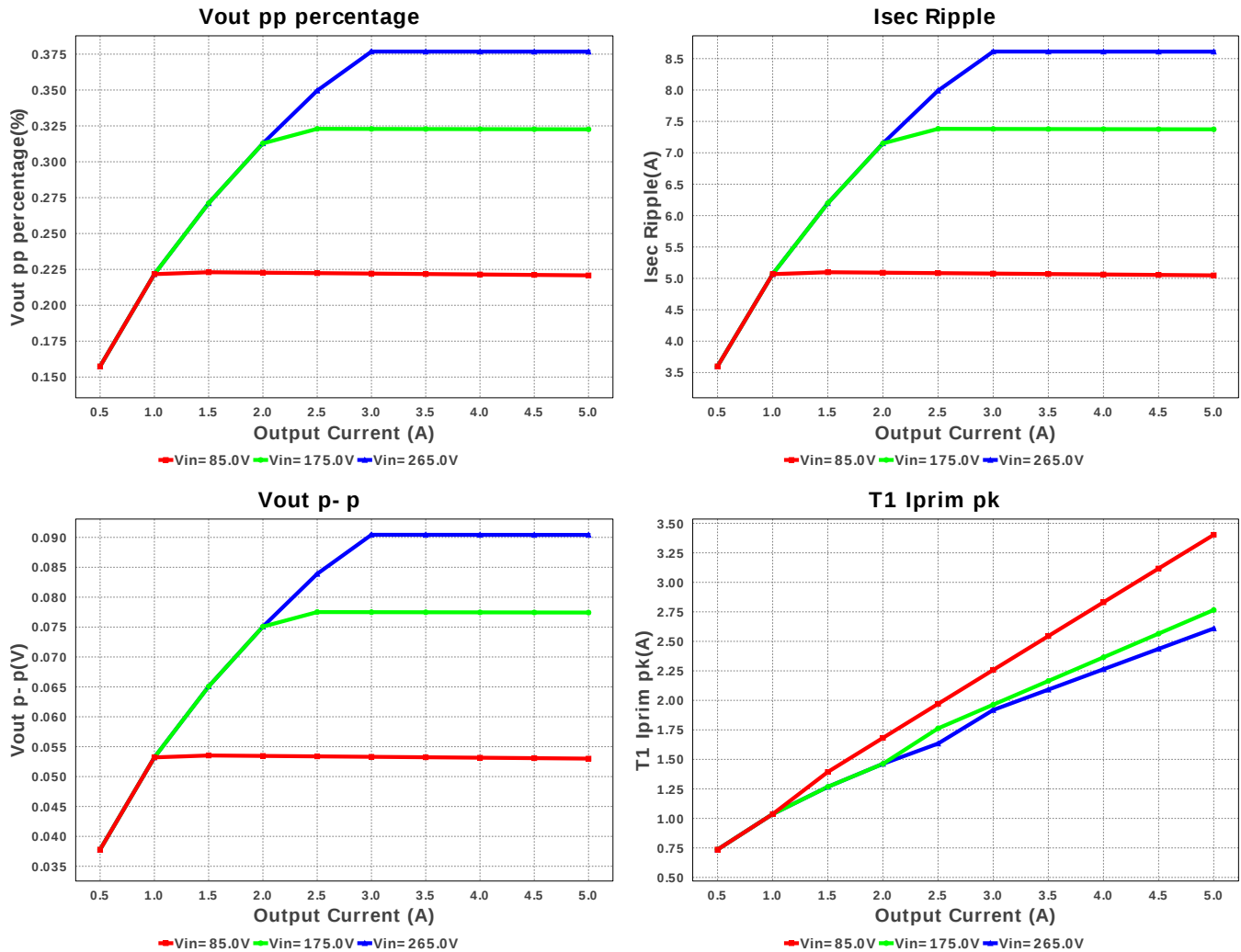












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	7.409 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	1.561 A	Current	Average input current
3.	Iout_DCM	1.072 A	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	1.741 A	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	1.032 A	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	35.764 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	5.048 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	2.254 A	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	3.403 A	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	8.938 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	16.639 A	Current	Transformer Secondary1 Peak Current
12.	BOM Count	51	General	Total Design BOM count
13.	Daux trr	0.0 ns	General	Auxiliary Diode Reverse Recovery Time
14.	Dsec Vf	522.788 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	522.788 mV	General	Effective Forward Voltage Drop at the Operating Current
17.	Dsnub trr	0.0 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	5.338 k mm ²	General	Total Foot Print Area of BOM components
19.	Frequency	27.787 kHz	General	Switching frequency
20.	Mode	CCM	General	Conduction Mode
21.	Pout	120.0 W	General	Total output power
22.	Tdead	0.0 ns	General	Approximate Dead Time of the Regulator
23.	Toff	12.749 us	General	Approximate Converter Off Time
24.	Ton Act	21.709 us	General	Approximate Converter On Time
25.	Total BOM	\$0.0	General	Total BOM Cost
26.	Tsw	35.988 us	General	Switching Time Period
27.	Vaux	13.974 V	General	Auxiliary Voltage
28.	Vsnub	201.281 V	General	Voltage Across the Snubber
29.	Vout Actual	24.004 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors

#	Name	Value	Category	Description
30.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
31.	Duty Cycle	60.322 %	Op_point	Duty cycle
32.	Efficiency	90.465 %	Op_point	Steady state efficiency
33.	IC Tj	33.564 degC	Op_point	IC junction temperature
34.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
35.	IOUT_OP	5.0 A	Op_point	Iout operating point
36.	M1 TjOP	79.779 degC	Op_point	M1 MOSFET junction temperature
37.	Vout p-p	53.004 mV	Op_point	Peak-to-peak output ripple voltage
38.	Cin Pd	39.862 mW	Power	Input capacitor power dissipation
39.	Cout1 Pd	576.365 mW	Power	Output capacitor1 power dissipation
40.	Dsec Pd	1.307 W	Power	Secondary Diode Power Dissipation
41.	Dsec2 Pd	1.307 W	Power	Secondary Diode Power Dissipation
42.	IC Pd	71.281 mW	Power	IC power dissipation
43.	L2 Pd	60.0 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
44.	M1 Pd	796.465 mW	Power	M1 MOSFET total power dissipation
45.	Paux	14.513 mW	Power	Power Dissipation in Raux and Daux
46.	Pd Rstartup	90.511 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
47.	Rdrv Pd	37.12 µW	Power	Power Dissipation in Gate Drive Resistor
48.	Rfb Pd	17.204 mW	Power	Rfb Power Dissipation
49.	Rsns Pd	1.045 W	Power	Current Limit Sense Resistor Power Dissipation
50.	Snubber Pd	3.208 W	Power	Snubber Power Dissipation
51.	T1 Pd	10.213 W	Power	Estimated Losses in Transformer
52.	Total Pd	0.0 W	Power	Total Power Dissipation
53.	Vout Tolerance	2.137 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
54.	Vout pp percentage	220.849 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	VinMax	265.0	Maximum input voltage
3.	VinMin	85.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	UCC28C42	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. UCC28C42 Product Folder : <http://www.ti.com/product/UCC28C42> : contains the data sheet and other resources.

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