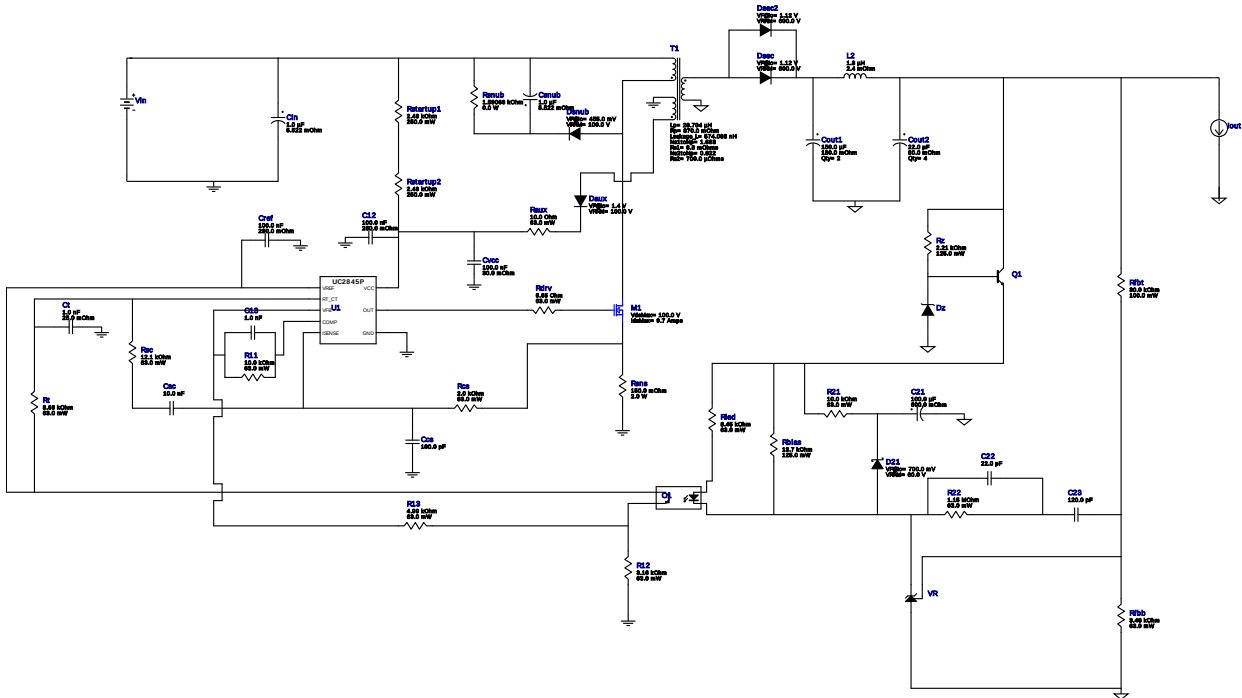


WEBENCH® Design Report

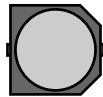
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UC2845N 24.0V-24.0V to 24.00V @ 1.0A

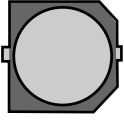
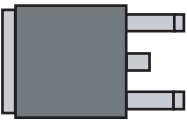
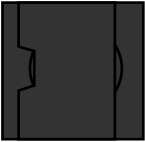


My Comments

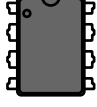
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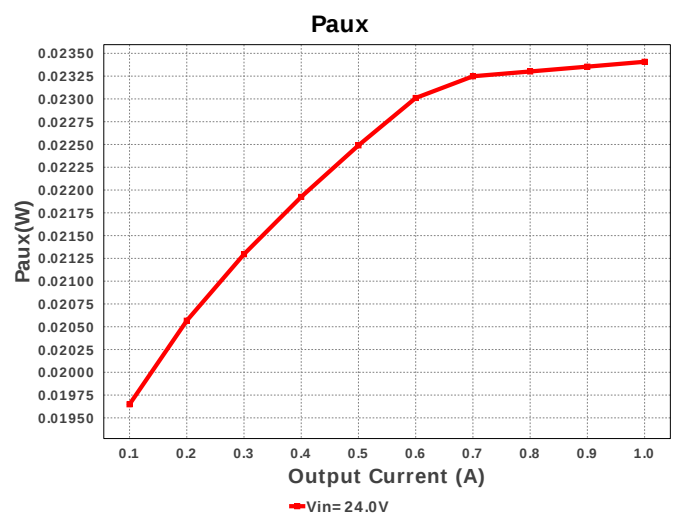
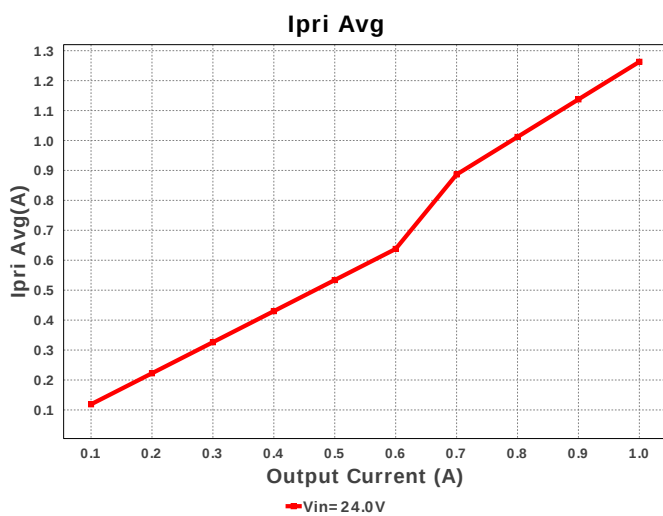
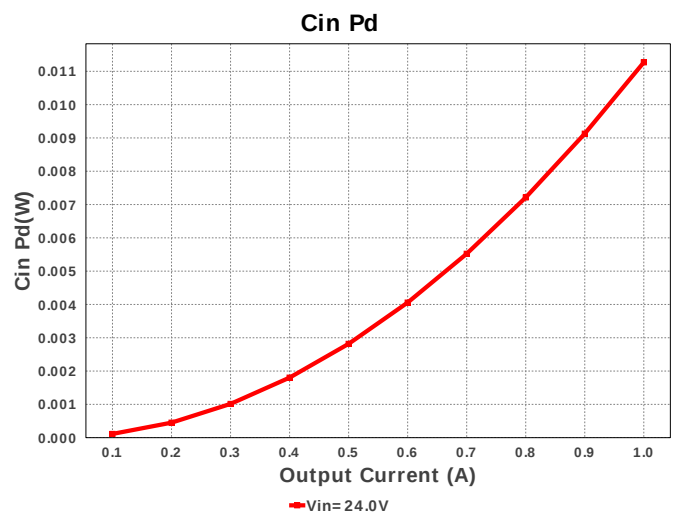
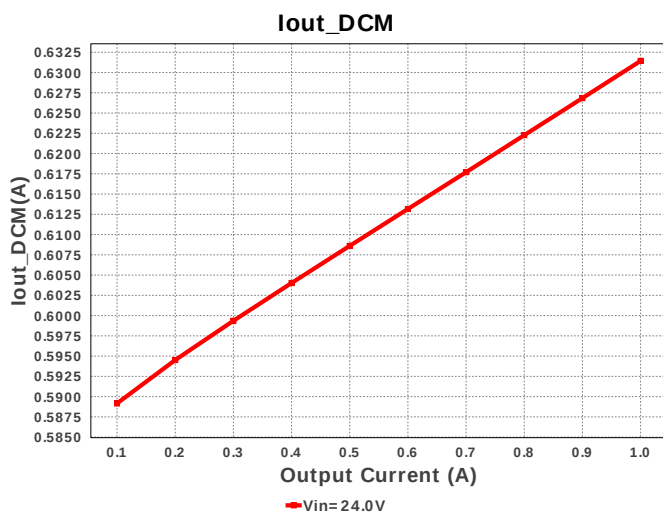
Electrical BOM

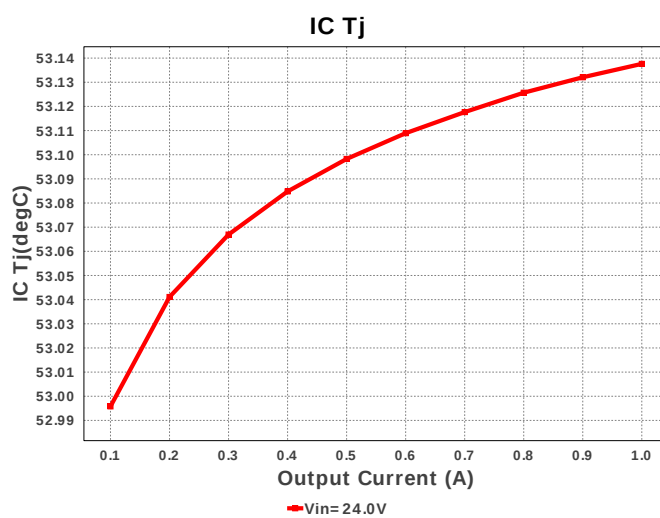
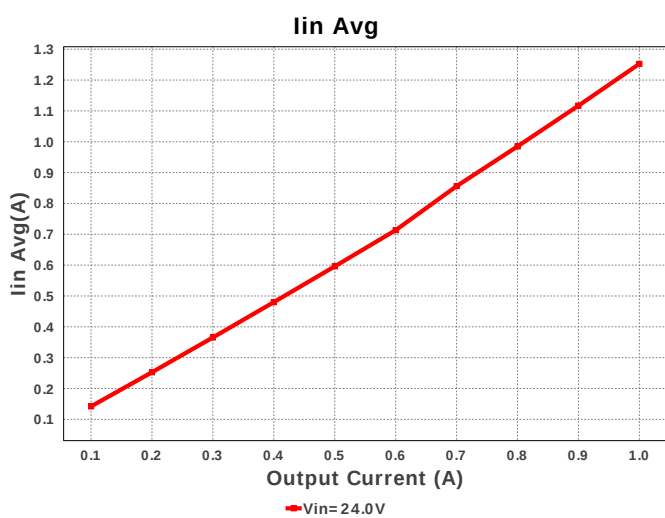
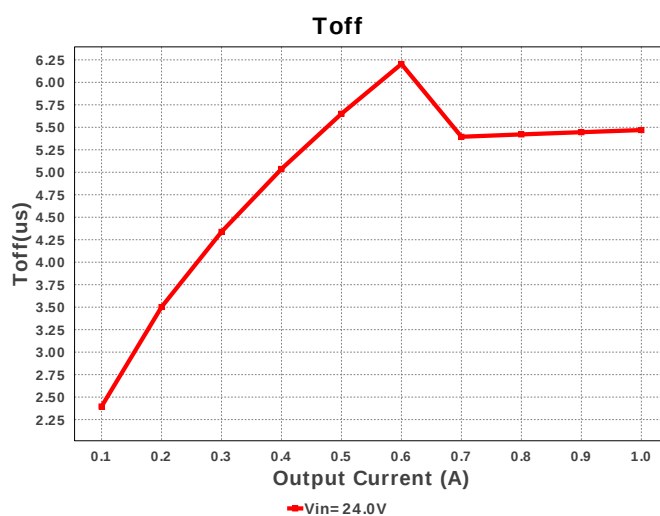
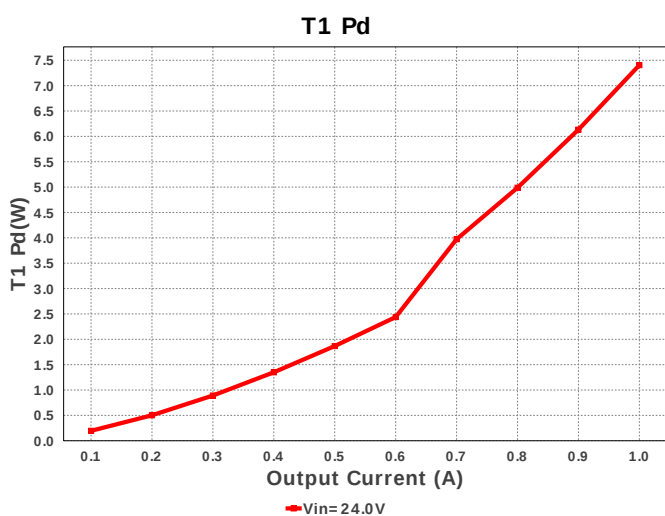
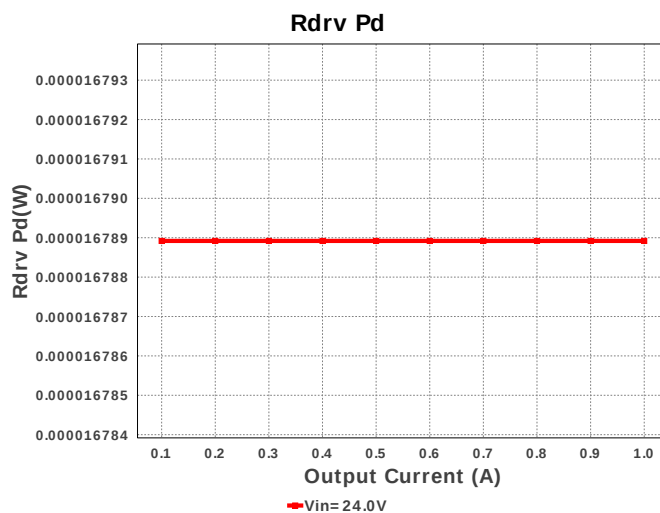
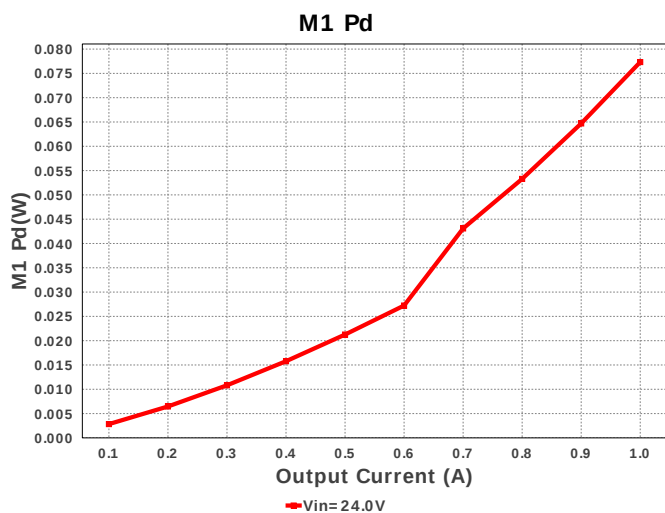
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1.	C12	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	C13	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	C21	Chemi-Con	EMVY500ADA101MHA0G Series= MVY	Cap= 100.0 uF ESR= 600.0 mOhm VDC= 50.0 V IRMS= 300.0 mA	1	\$0.21	 CAPSMT_62_HA0 106 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	TDK	C1608X7R1V105K080AC Series= X7R	Cap= 1.0 uF ESR= 5.522 mOhm VDC= 35.0 V IRMS= 2.2162 A	1	\$0.05	0603 5 mm ²

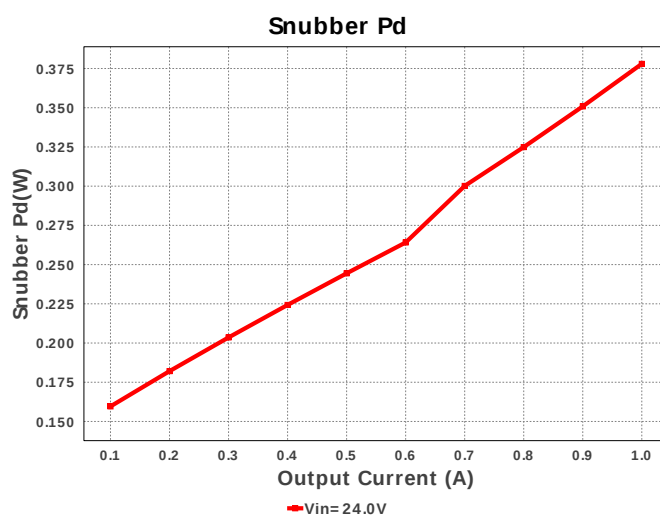
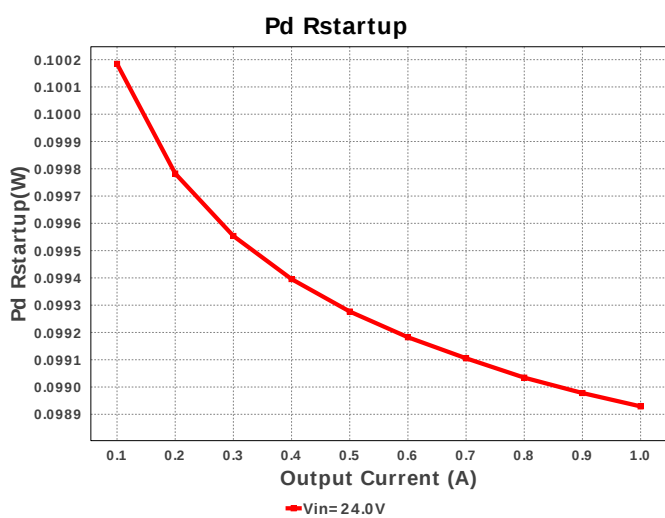
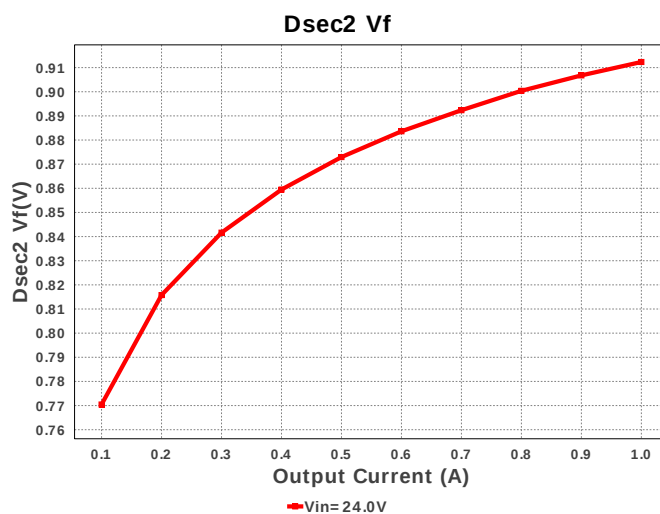
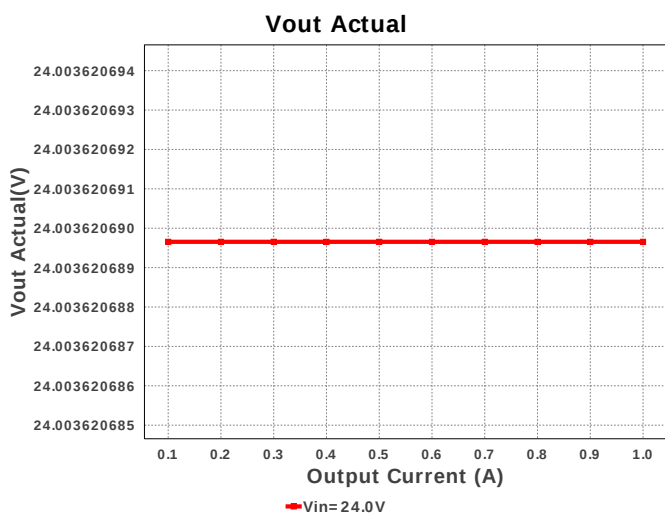
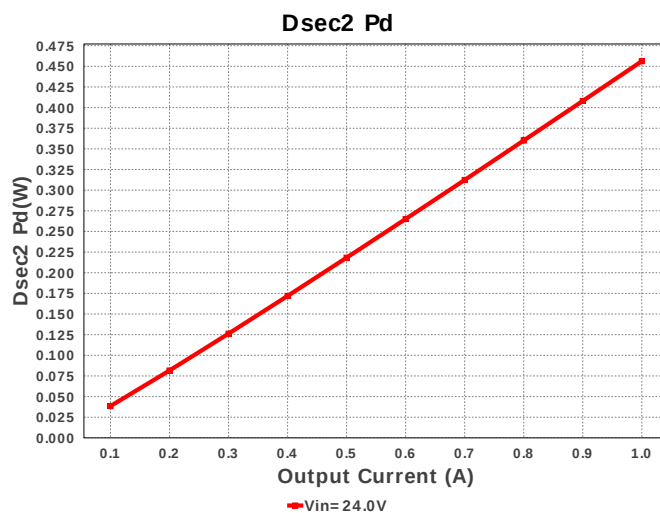
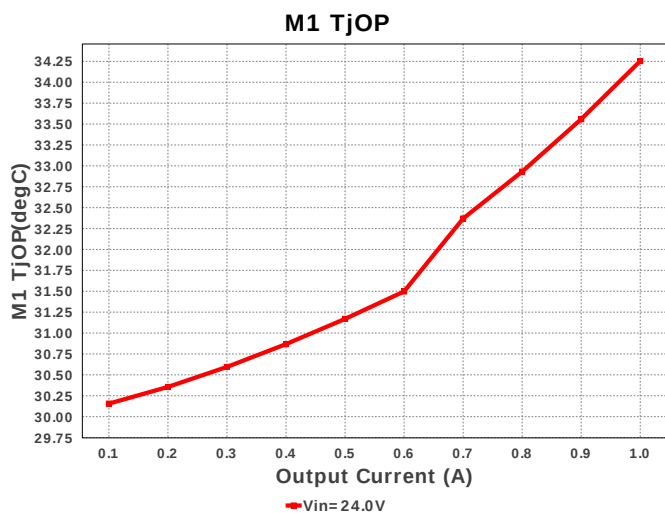
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8.	Cout1	Nichicon	UUD1H151MNL1GS Series= uD	Cap= 150.0 uF ESR= 180.0 mOhm VDC= 50.0 V IRMS= 670.0 mA	2	\$0.26	 SM_RADIAL_10BMM 160 mm ²
9.	Cout2	Panasonic	EEHZA1H220P Series= ?	Cap= 22.0 uF ESR= 80.0 mOhm VDC= 50.0 V IRMS= 1.1 A	4	\$0.50	 SM_RADIAL_6.3AMM 80 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	TDK	C1608X7R1V105K080AC Series= X7R	Cap= 1.0 uF ESR= 5.522 mOhm VDC= 35.0 V IRMS= 2.2162 A	1	\$0.05	 0603 5 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.	Cvcc	MuRata	GRM188R71E104KA01D Series= X7R	Cap= 100.0 nF ESR= 30.0 mOhm VDC= 25.0 V IRMS= 1.51 A	1	\$0.01	 0603 5 mm ²
15.	D21	Diodes Inc.	B160-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	\$0.06	 SMA 37 mm ²
16.	Daux	NXP Semiconductor	BAS316,115	VF@Io= 1.4 V VRRM= 100.0 V	1	\$0.02	 SOD-323 9 mm ²
17.	Dsec	Bourns	CD214C-F3600	VF@Io= 1.12 V VRRM= 600.0 V	1	\$0.18	 SMC 83 mm ²
18.	Dsec2	Bourns	CD214C-F3600	VF@Io= 1.12 V VRRM= 600.0 V	1	\$0.18	 SMC 83 mm ²
19.	Dsnub	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 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
22.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 9.7 Amps	1	\$0.75	 TRANS_NexFET_Q3 18 mm ²

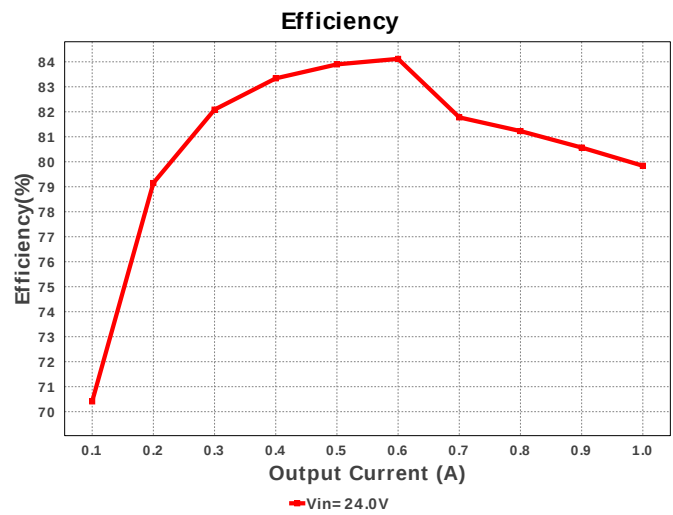
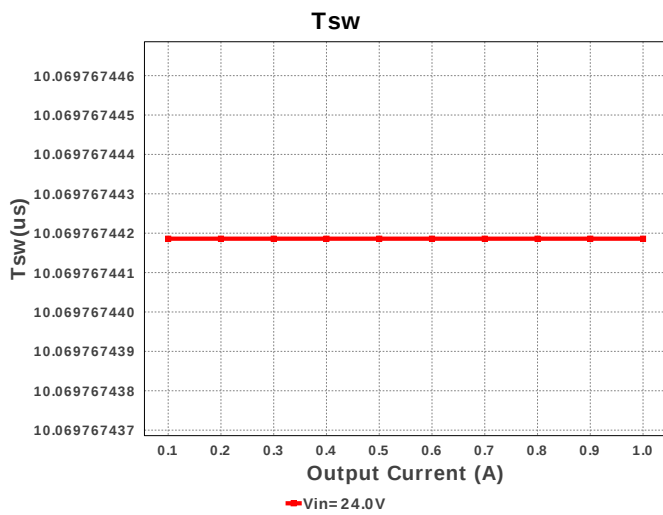
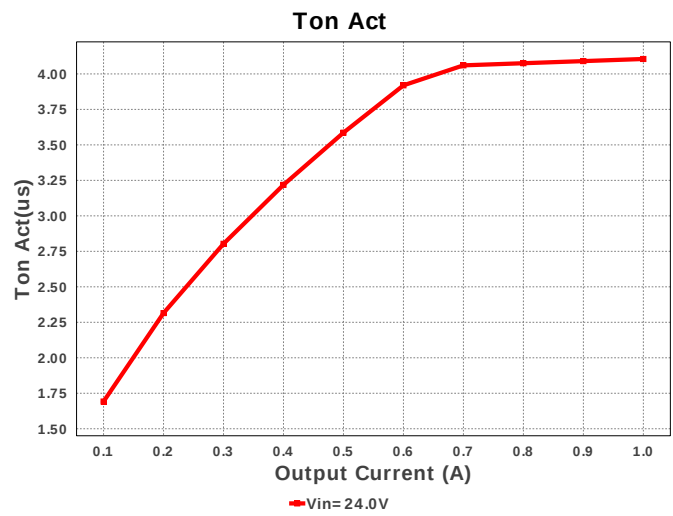
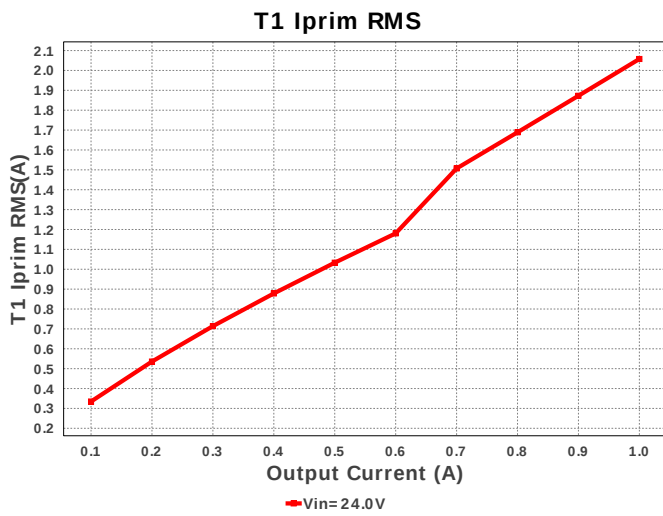
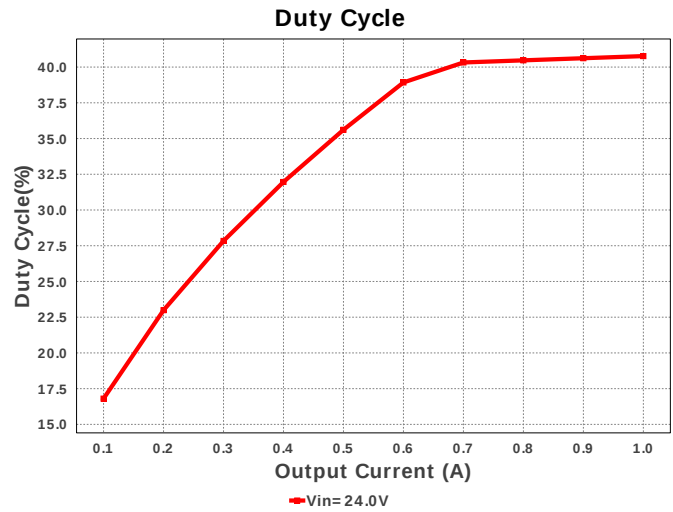
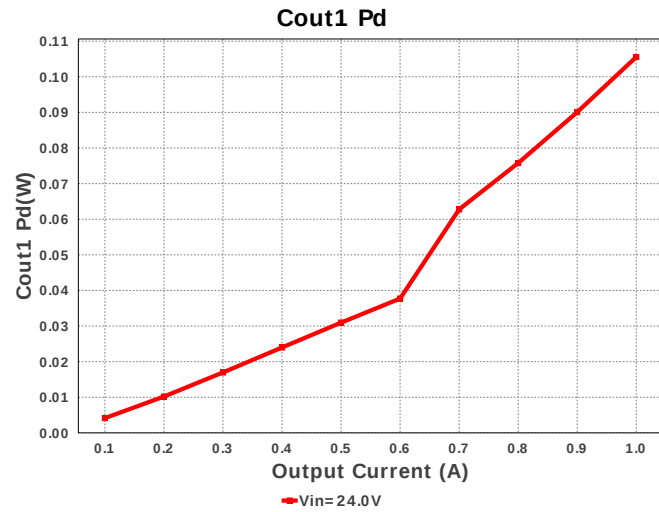
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
23.	O1	Vishay-Semiconductor	TCMT1107	Optocoupler	1	\$0.21	 SOP-4 44 mm ²
24.	Q1	ON Semiconductor	BC846BLT1G	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm ²
25.	R11	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
26.	R12	Vishay-Dale	CRCW04023K16FKED Series= CRCW..e3	Res= 3.16 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
27.	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
28.	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
29.	R22	Vishay-Dale	CRCW04021M15FKED Series= CRCW..e3	Res= 1.15 MOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
30.	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
31.	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
32.	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
33.	Rdrv	Vishay-Dale	CRCW04026R65FKED Series= CRCW..e3	Res= 6.65 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
34.	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
35.	Rfbt	Yageo America	RC0603FR-0730KL Series= ?	Res= 30.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
36.	Rled	Vishay-Dale	CRCW04028K45FKED Series= CRCW..e3	Res= 8.45 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
37.	Rsc	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.	Rsns	Stackpole Electronics Inc	CSRN2512FKR150 Series= ?	Res= 150.0 mOhm Power= 2.0 W Tolerance= 1.0%	1	\$0.13	 2512 43 mm ²
39.	Rsnu	CUSTOM	CUSTOM Series= ?	Res= 1.59066 kOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm ²
40.	Rstartup1	Panasonic	ERJ-8ENF2431V Series= ERJ-8E	Res= 2.43 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
41.	Rstartup2	Panasonic	ERJ-8ENF2431V Series= ERJ-8E	Res= 2.43 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
42.	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
43.	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

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
44.	T1	CUSTOM	CUSTOM	Lp= 28.704 μ H Rp= 870.0 mOhm Leakage_L= 574.088 nH Ns1toNp= 1.683 Rs1= 8.6 mOhms Ns2toNp= 0.822 Rs2= 700.0 μ Ohms	1	NA	CUSTOM 0 mm ²
45.	U1	Texas Instruments	UC2845N	Switcher	1	\$0.64	 P0008A 116 mm ²
46.	VR	Texas Instruments	TL431AIDBVR	Voltage References	1	\$0.07	 R-PDSO-G3 16 mm ²

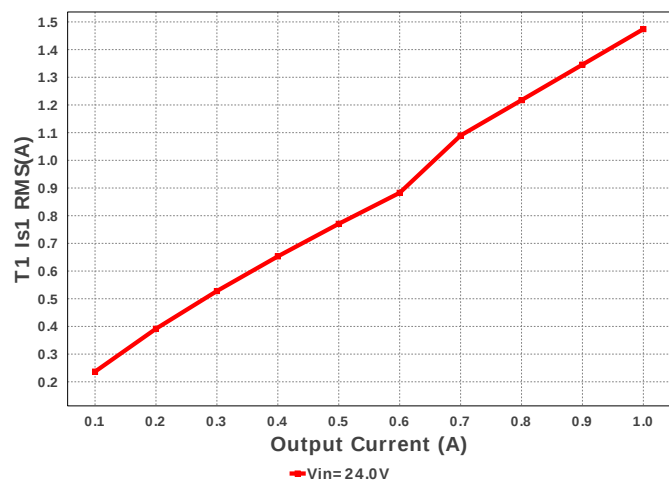




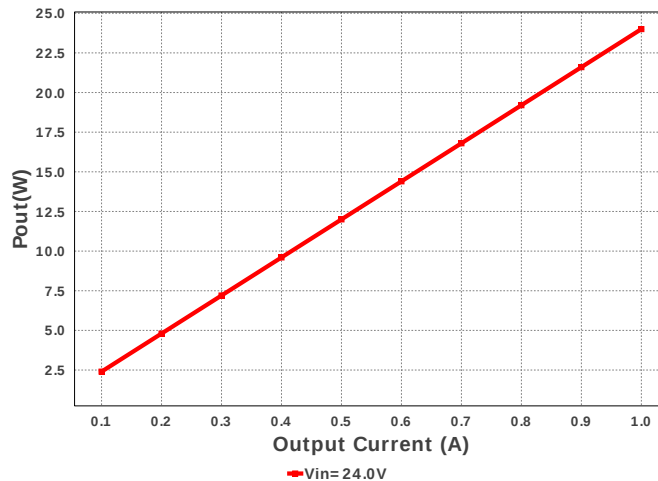




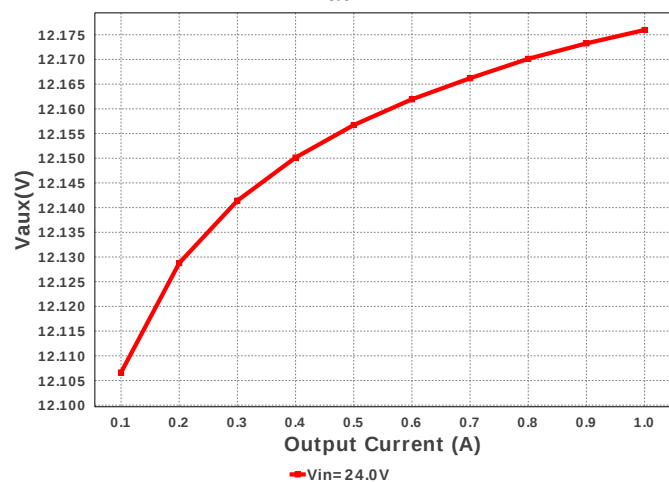
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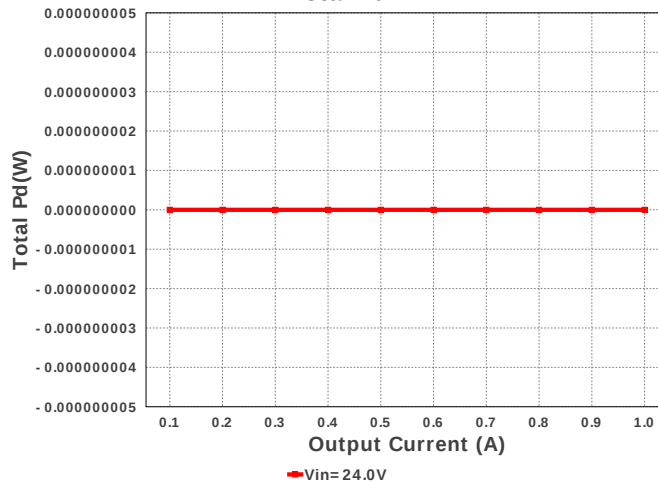
Pout



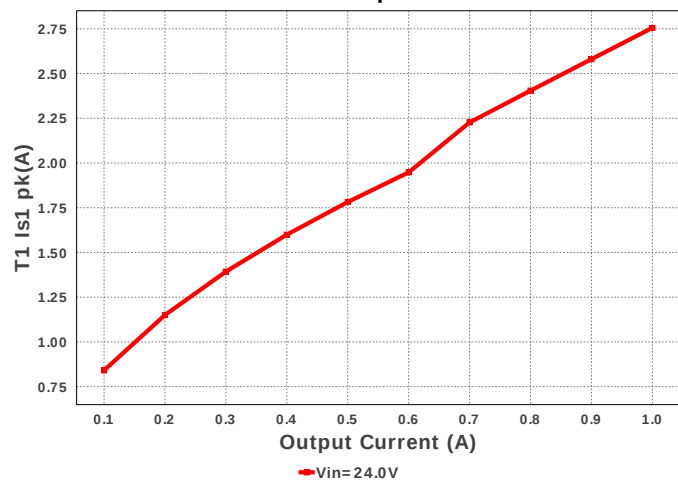
Vaux



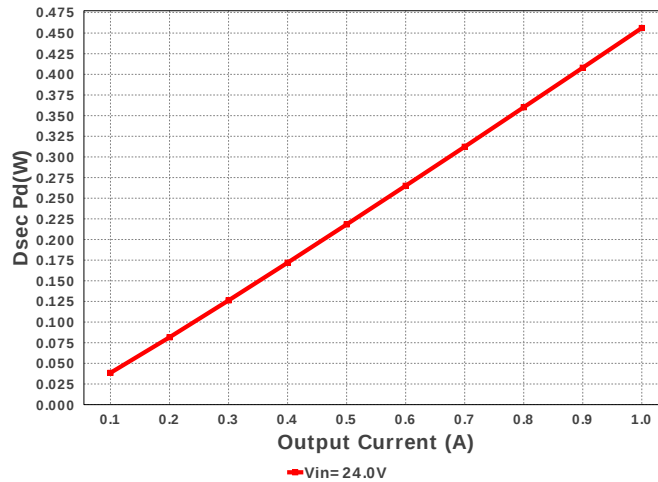
Total Pd

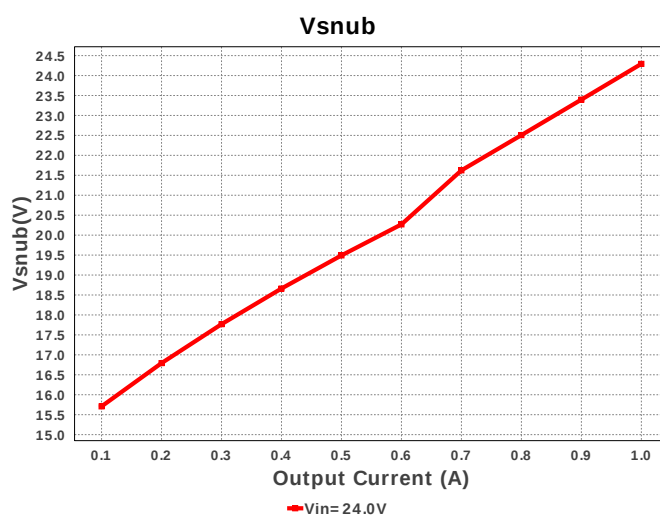
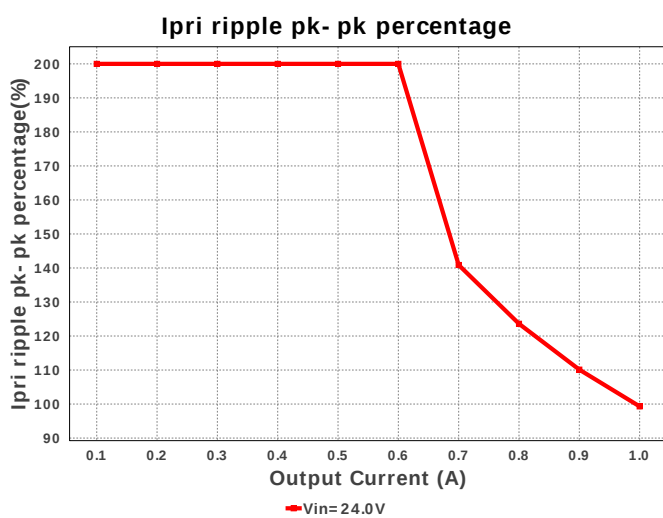
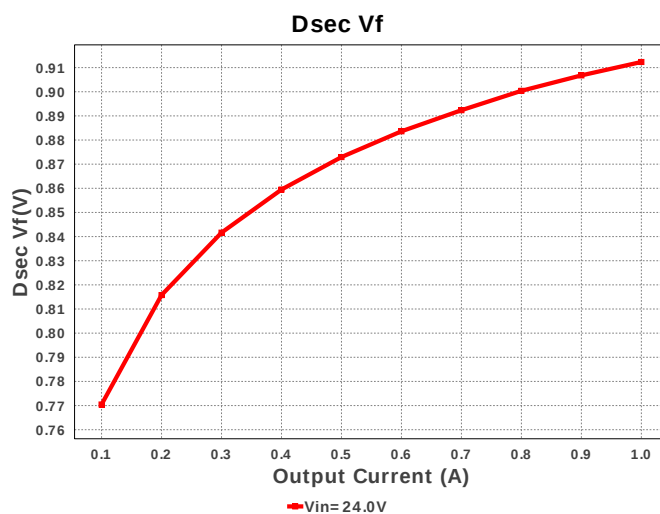
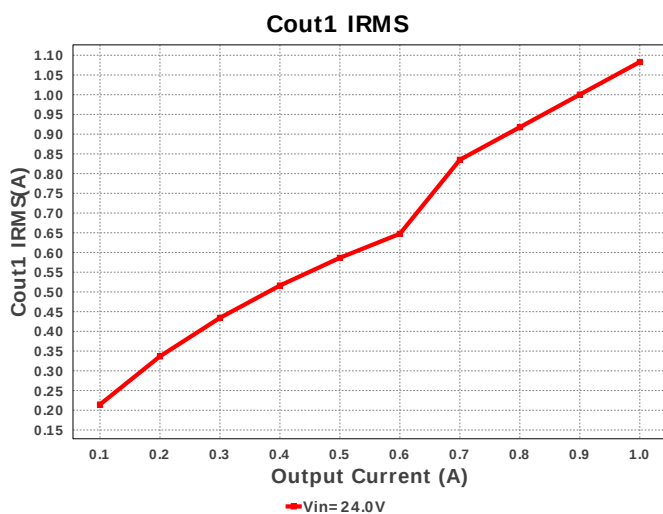
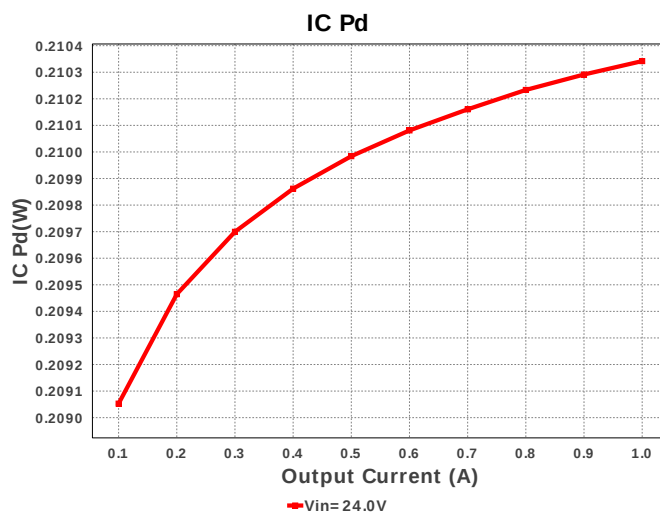
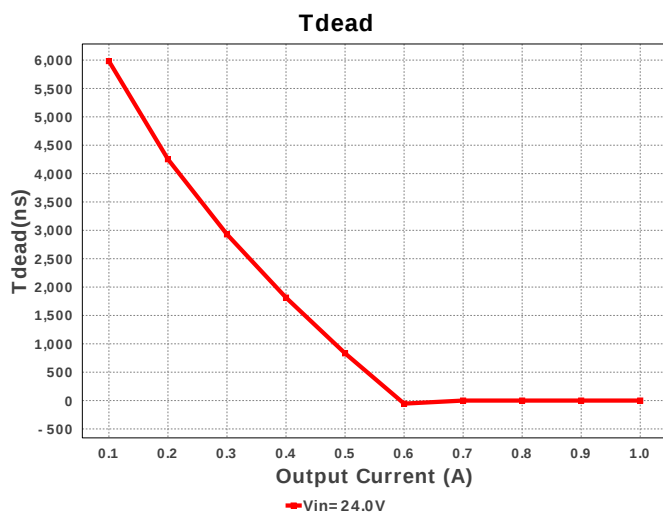


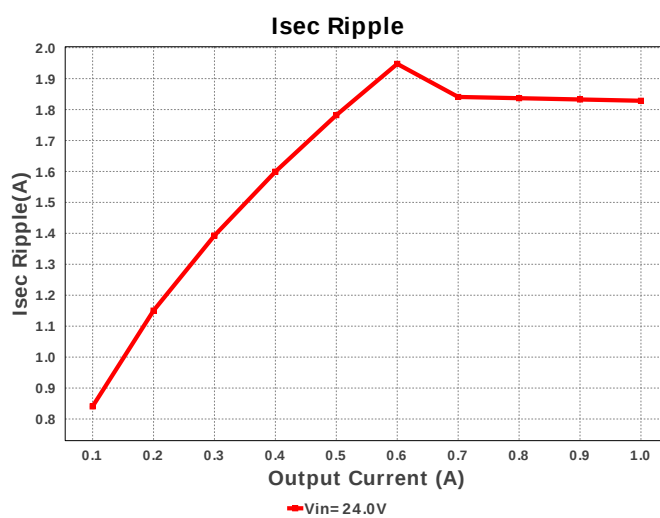
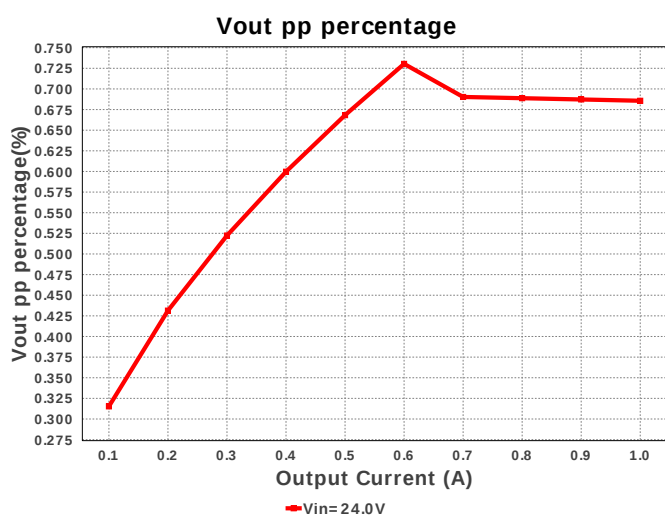
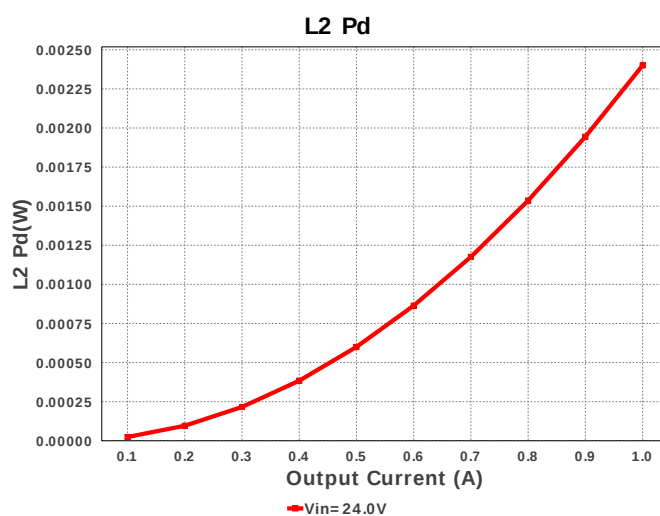
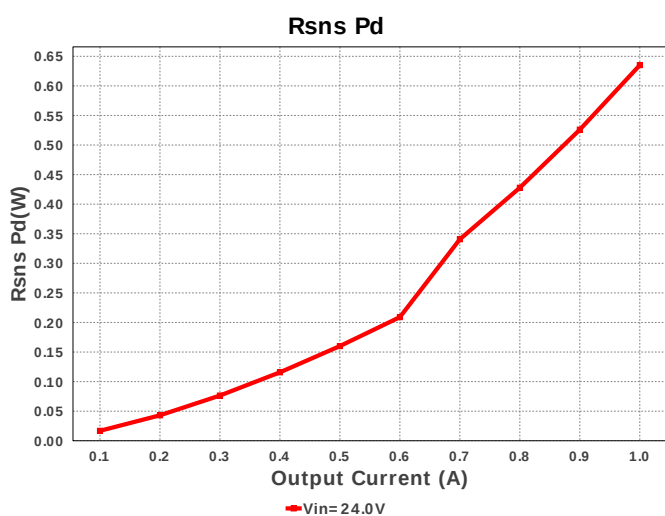
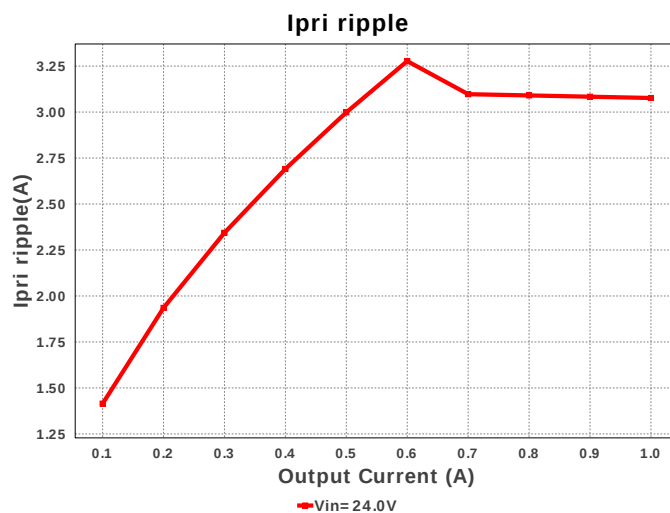
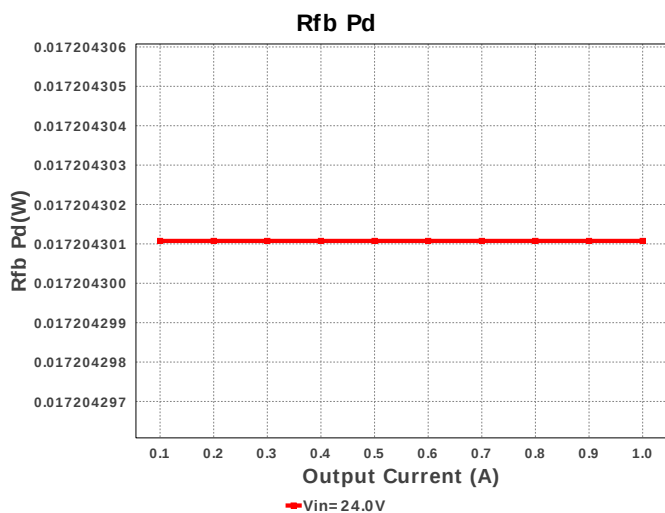
T1 Is1 pk

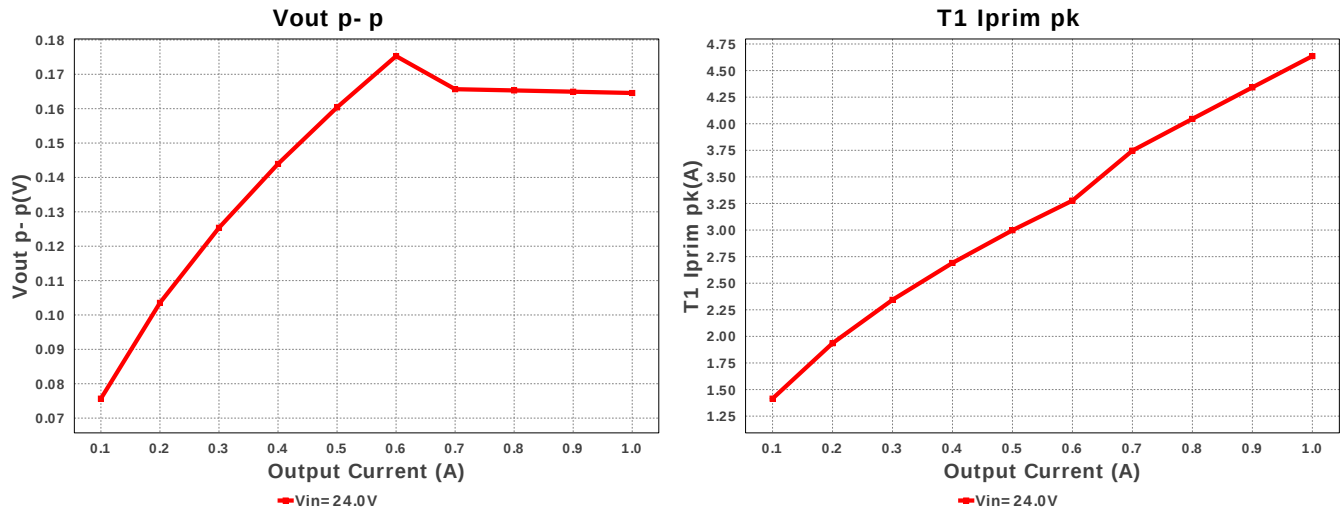


Dsec Pd









Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	1.083 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	1.253 A	Current	Average input current
3.	Iout_DCM	631.437 mA	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	1.263 A	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	3.077 A	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	99.313 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	1.828 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	2.058 A	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	4.636 A	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	1.474 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	2.755 A	Current	Transformer Secondary1 Peak Current
12.	BOM Count	50	General	Total Design BOM count
13.	Daux trr	4.0 ns	General	Auxiliary Diode Reverse Recovery Time
14.	Dsec Vf	912.33 mV	General	Effective Forward Voltage Drop at the Operating Current
15.	Dsec trr	30.0 ns	General	Output Diode Reverse Recovery Time
16.	Dsec2 Vf	912.33 mV	General	Effective Forward Voltage Drop at the Operating Current
17.	Dsnub trr	0.0 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	1.811 k mm ²	General	Total Foot Print Area of BOM components
19.	Frequency	99.307 kHz	General	Switching frequency
20.	Pout	24.0 W	General	Total output power
21.	Tdead	0.0 ns	General	Approximate Dead Time of the Regulator
22.	Toff	5.469 us	General	Approximate Converter Off Time
23.	Ton Act	4.105 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	12.176 V	General	Auxiliary Voltage
27.	Vsnub	24.293 V	General	Voltage Across the Snubber
28.	Vout Actual	24.004 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
29.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
30.	Duty Cycle	40.768 %	Op_point	Duty cycle
31.	Efficiency	79.84 %	Op_point	Steady state efficiency
32.	IC Tj	53.138 degC	Op_point	IC junction temperature
33.	ICThetaJA	110.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
34.	IOUT_OP	1.0 A	Op_point	Iout operating point
35.	M1 TJOP	34.253 degC	Op_point	M1 MOSFET junction temperature
36.	Vout p-p	164.56 mV	Op_point	Peak-to-peak output ripple voltage
37.	Cin Pd	11.269 mW	Power	Input capacitor power dissipation
38.	Cout1 Pd	105.551 mW	Power	Output capacitor1 power dissipation
39.	Dsec Pd	456.165 mW	Power	Secondary Diode Power Dissipation
40.	Dsec2 Pd	456.165 mW	Power	Secondary Diode Power Dissipation
41.	IC Pd	210.342 mW	Power	IC power dissipation
42.	L2 Pd	2.4 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
43.	M1 Pd	77.328 mW	Power	M1 MOSFET total power dissipation
44.	Paux	23.408 mW	Power	Power Dissipation in Raux and Daux
45.	Pd Rstartup	98.929 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
46.	Rdrv Pd	16.789 μW	Power	Power Dissipation in Gate Drive Resistor
47.	Rfb Pd	17.204 mW	Power	Rfb Power Dissipation
48.	Rsns Pd	635.078 mW	Power	Current Limit Sense Resistor Power Dissipation
49.	Snubber Pd	377.958 mW	Power	Snubber Power Dissipation
50.	T1 Pd	7.404 W	Power	Estimated Losses in Transformer

#	Name	Value	Category	Description
51.	Total Pd	0.0 W	Power	Total Power Dissipation
52.	Vout Tolerance	2.137 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
53.	Vout pp percentage	685.668 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	24.0	Maximum input voltage
3.	VinMin	24.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	UC2845	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **UC2845** Product Folder : <http://www.ti.com/product/UC2845> : contains the data sheet and other resources.

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