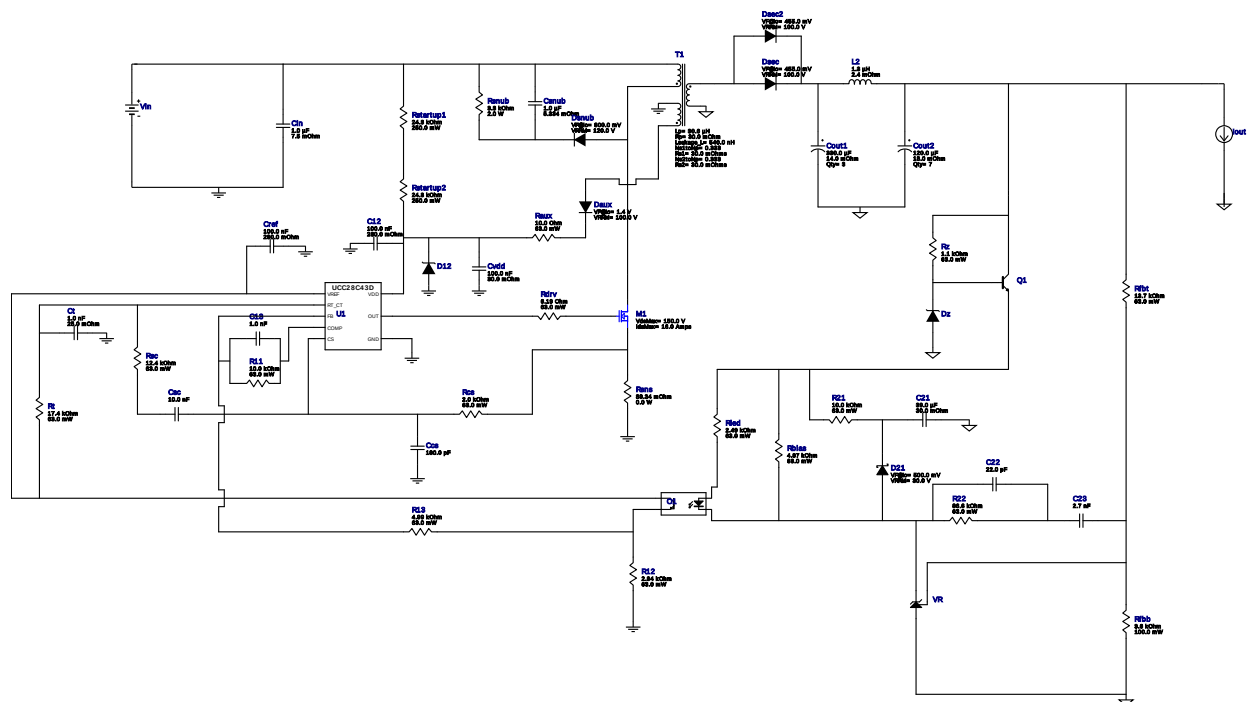
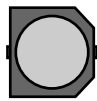


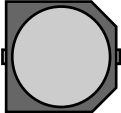
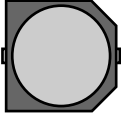
WEBENCH® Design Report

Design : 4213487/4 UCC28C43DR
UCC28C43DR 28.0V-28.0V to 12.00V @ 6.0A

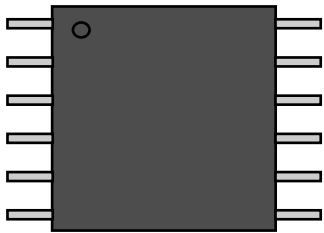


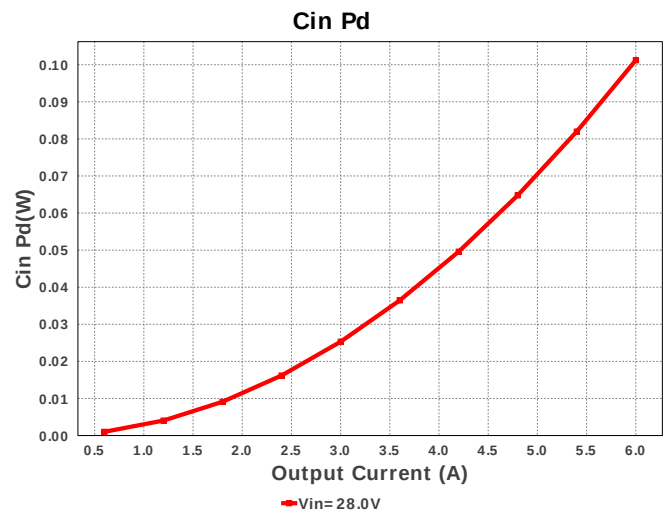
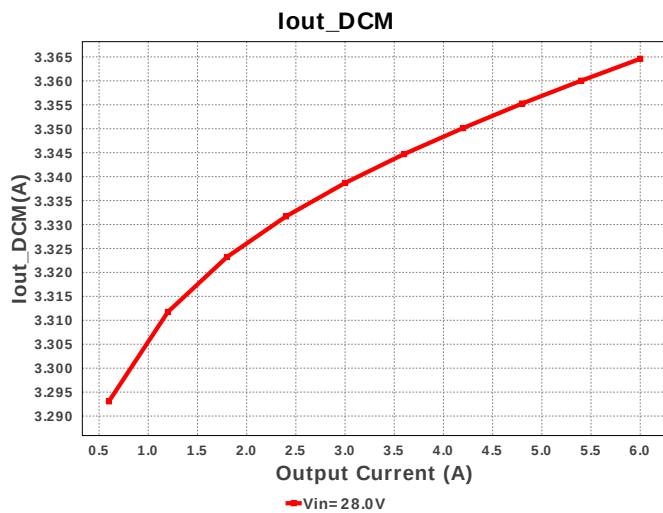
Electrical BOM

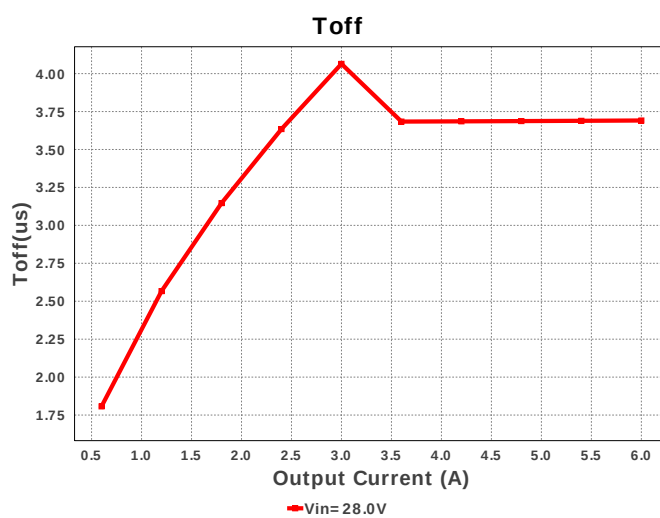
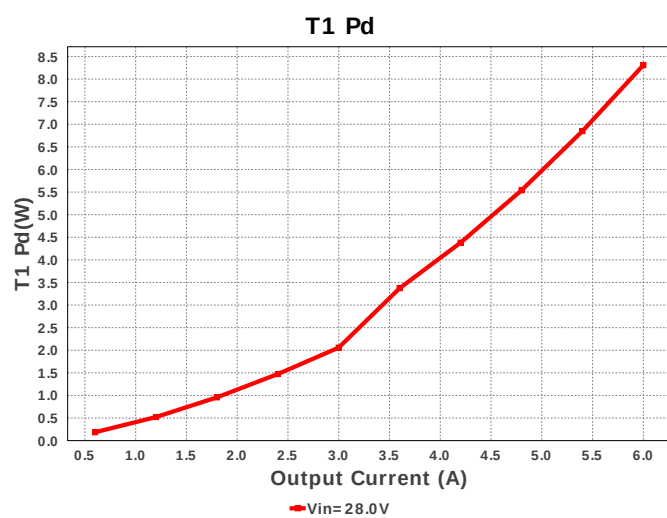
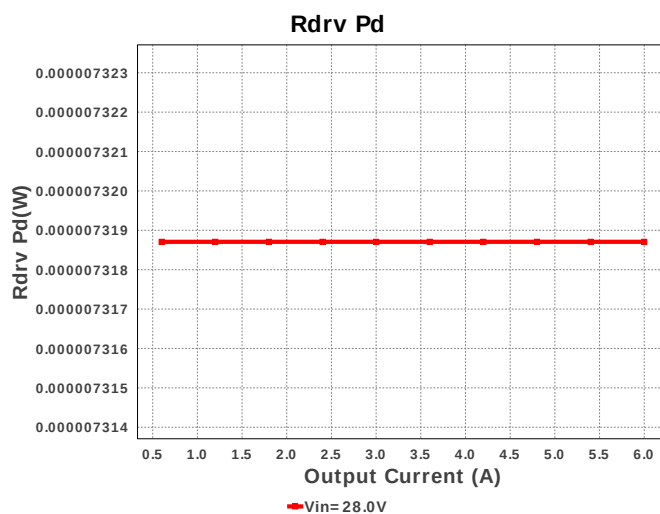
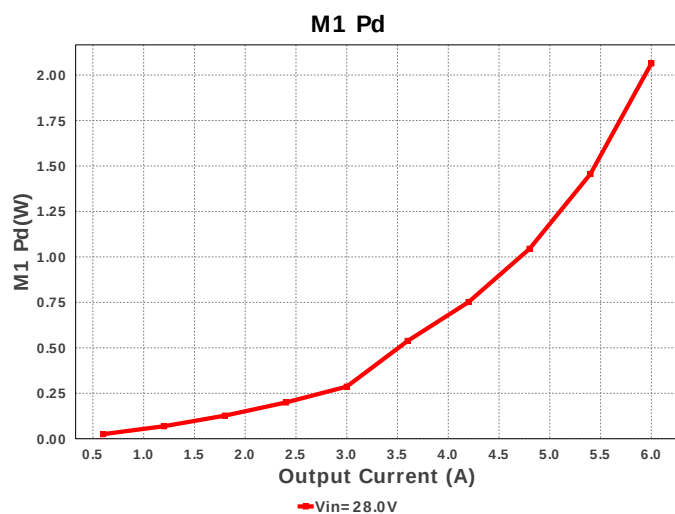
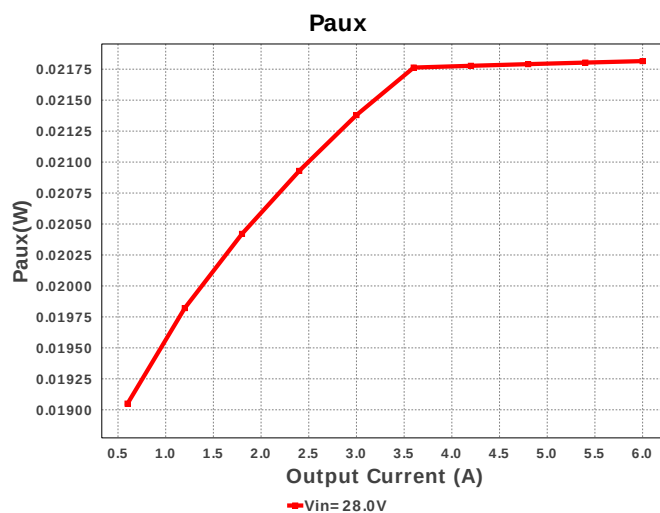
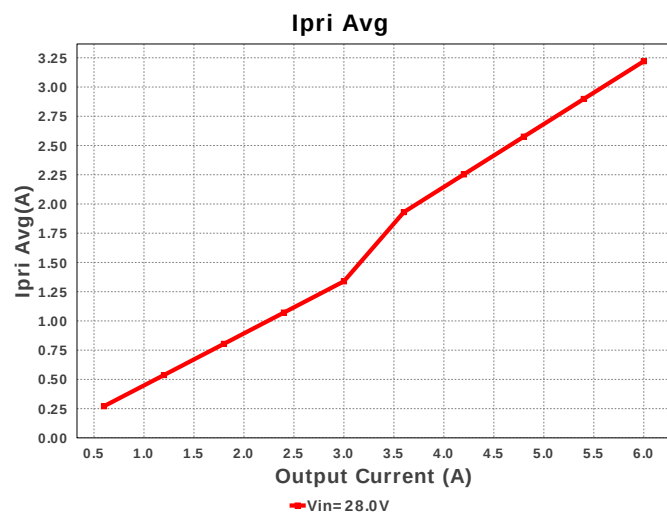
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1.	C12	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	C13	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	C21	Panasonic	35SVPF39M Series= ?	Cap= 39.0 uF ESR= 30.0 mOhm VDC= 35.0 V IRMS= 2.8 A	1	\$0.50	 CAPSMT_62_E7 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	Yageo America	CC0805KRX7R9BB272 Series= X7R	Cap= 2.7 nF 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	C3216X7R2A105M160AA Series= X7R	Cap= 1.0 uF ESR= 7.5 mOhm VDC= 100.0 V IRMS= 5.9235 A	1	\$0.11	1206 11 mm ²

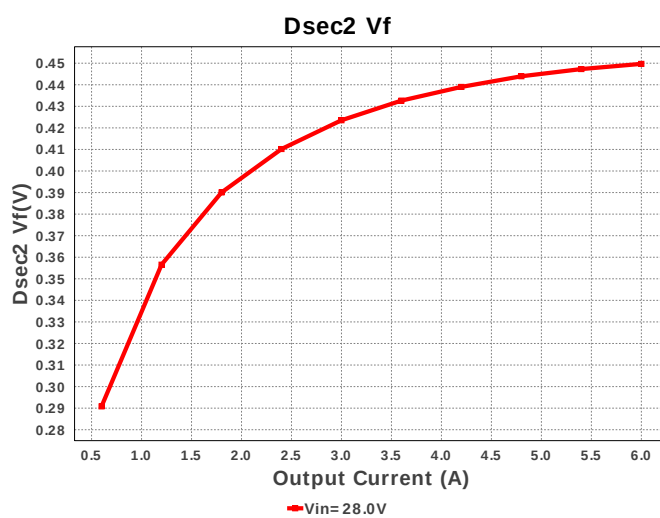
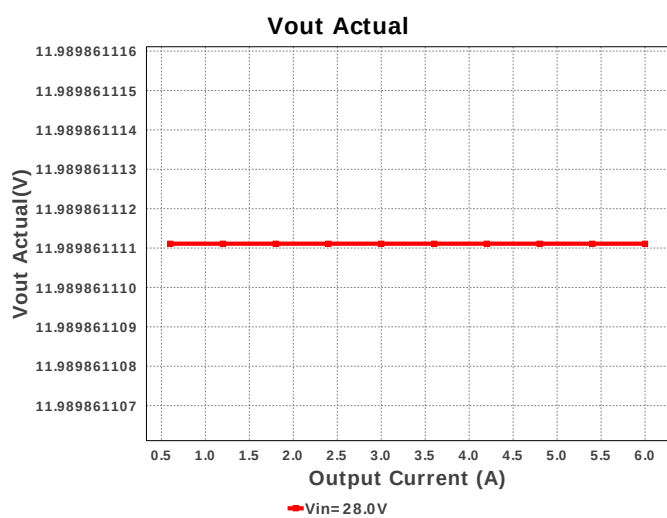
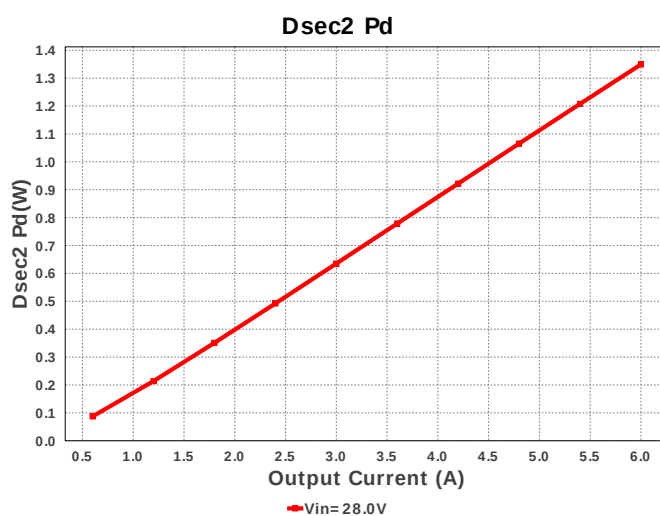
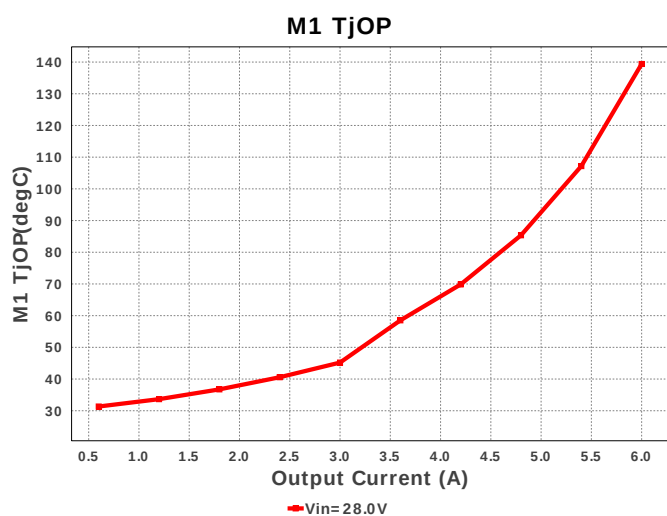
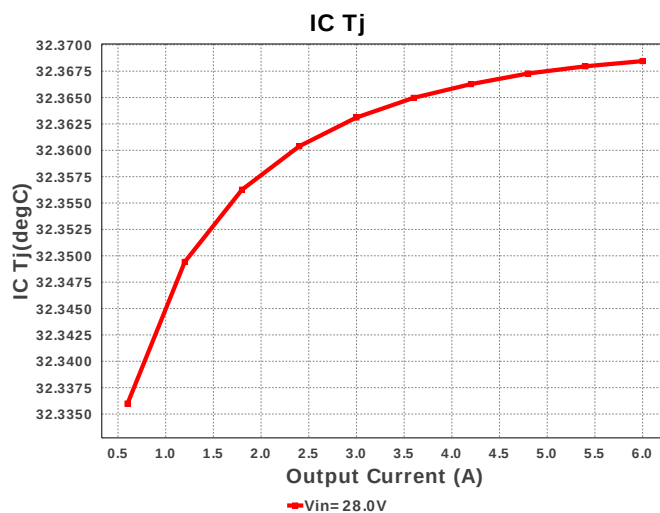
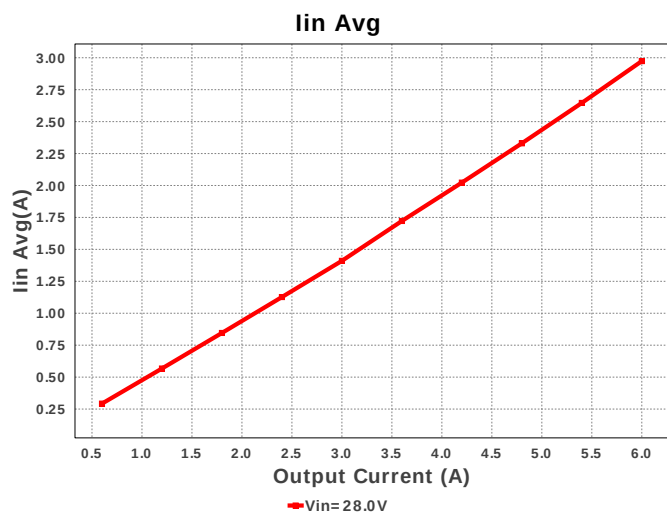
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8.	Cout1	Panasonic	25SVPF330M Series= ?	Cap= 330.0 uF ESR= 14.0 mOhm VDC= 25.0 V IRMS= 5.0 A	3	\$0.70	 CAPSMT_62_F12 151 mm²
9.	Cout2	Panasonic	35SVPF120M Series= ?	Cap= 120.0 uF ESR= 18.0 mOhm VDC= 35.0 V IRMS= 4.4 A	7	\$0.70	 CAPSMT_62_F12 151 mm²
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.	Cvdd	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 mm²
15.	D12	Diodes Inc.	MMSZ5248B-7-F	Zener	1	\$0.04	 SOD-123 13 mm²
16.	D21	Diodes Inc.	B230A-13-F	VF@Io= 500.0 mV VRRM= 30.0 V	1	\$0.09	 SMA 37 mm²
17.	Daux	NXP Semiconductor	BAS316,115	VF@Io= 1.4 V VRRM= 100.0 V	1	\$0.02	 SOD-323 9 mm²
18.	Dsec	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm²
19.	Dsec2	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm²
20.	Dsnub	Fairchild Semiconductor	FSV10120V	VF@Io= 800.0 mV VRRM= 120.0 V	1	\$0.21	 TO-277A 56 mm²
21.	Dz	ON Semiconductor	BZX84C9V1LT1G	Zener	1	\$0.02	 SOT-23 14 mm²
22.	L2	Coilcraft	MLC1250-132MLB	L= 1.3 uH DCR= 2.4 mOhm	1	\$0.79	 MLC1250 165 mm²

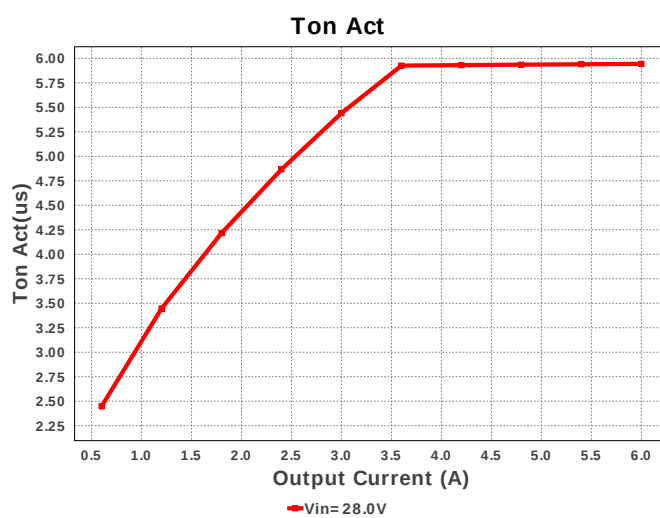
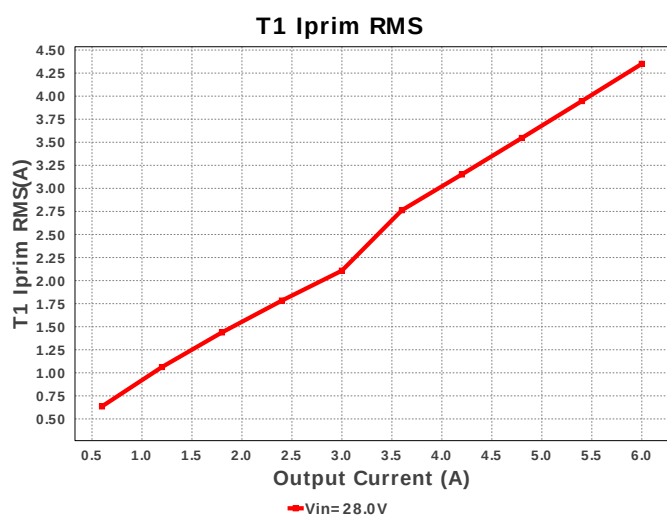
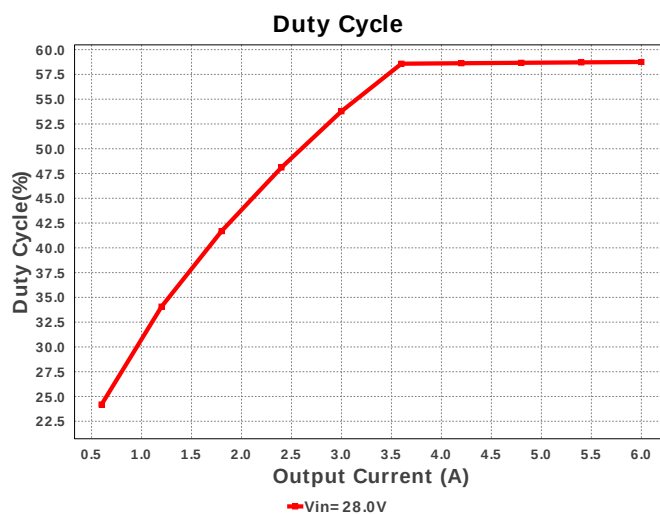
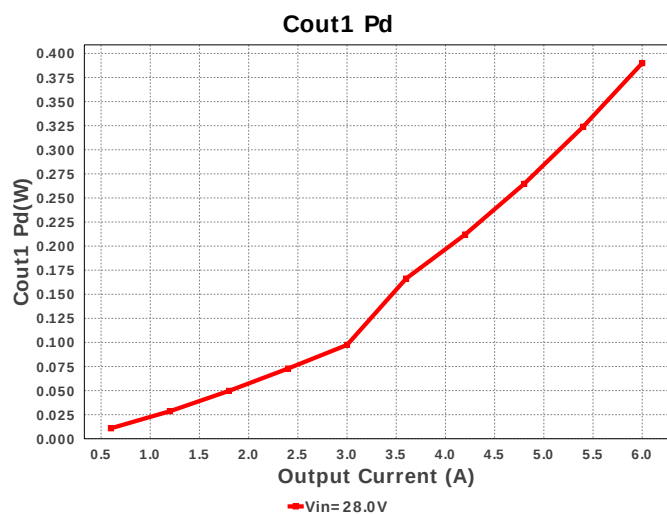
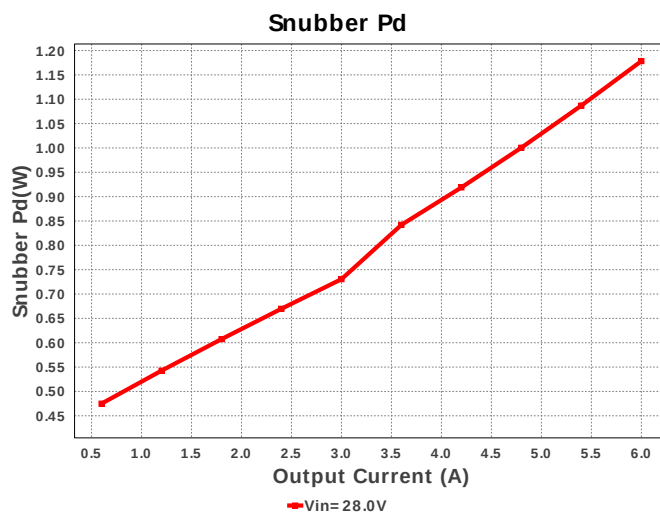
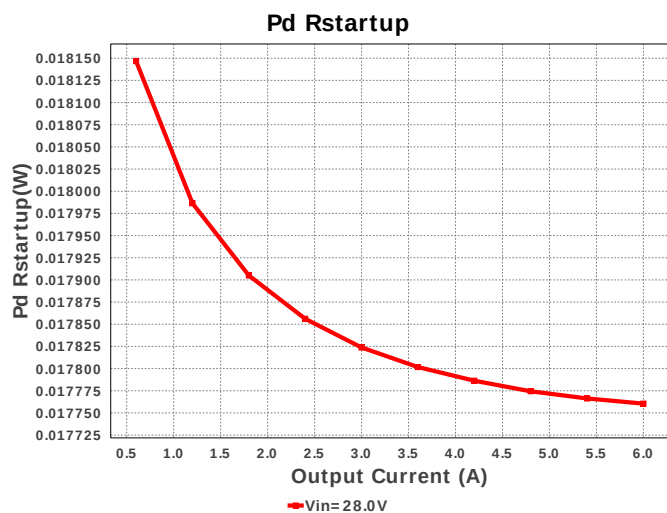
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
23.	M1	Fairchild Semiconductor	FDMC86240	VdsMax= 150.0 V IdsMax= 16.0 Amps	1	\$0.93	 TRANS_Fairchild_MLP08S 18 mm ²
24.	O1	Vishay-Semiconductor	TCMT1107	Optocoupler	1	\$0.21	 SOP-4 44 mm ²
25.	Q1	ON Semiconductor	BC846BLT1G	Bipolar Transistor	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	CRCW04022K94FKED Series= CRCW..e3	Res= 2.94 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	CRCW040286K6FKED Series= CRCW..e3	Res= 86.6 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	Vishay-Dale	CRCW04024K87FKED Series= CRCW..e3	Res= 4.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 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	CRCW04026R19FKED Series= CRCW..e3	Res= 6.19 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
35.	Rfbb	Yageo America	RC0603FR-073K6L Series= ?	Res= 3.6 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
36.	Rfbt	Vishay-Dale	CRCW040213K7FKED Series= CRCW..e3	Res= 13.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
37.	Rled	Vishay-Dale	CRCW04022K49FKED Series= CRCW..e3	Res= 2.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
38.	Rsc	Vishay-Dale	CRCW040212K4FKED Series= CRCW..e3	Res= 12.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
39.	Rsns	CUSTOM	CUSTOM Series= ?	Res= 88.34 mOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm ²
40.	Rsnub	Vishay-Bccomponents	PR02000203301JR500 Series= ?	Res= 3.3 kOhm Power= 2.0 W Tolerance= 5.0%	1	\$0.05	PR02 113 mm ²
41.	Rstartup1	Panasonic	ERJ-8ENF2432V Series= ERJ-8E	Res= 24.3 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
42.	Rstartup2	Panasonic	ERJ-8ENF2432V Series= ERJ-8E	Res= 24.3 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²

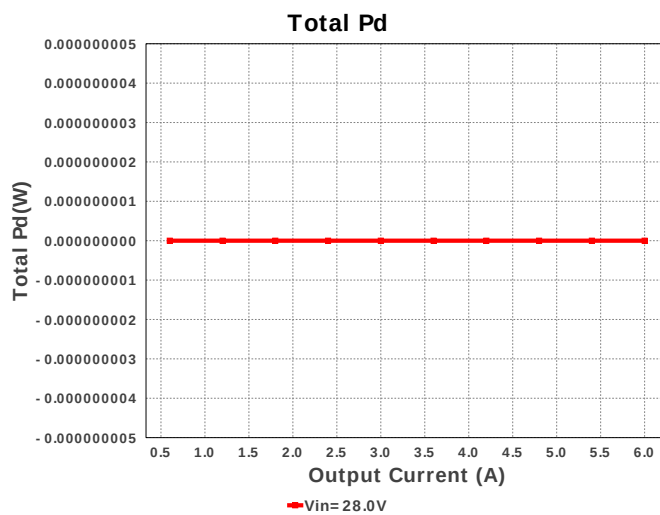
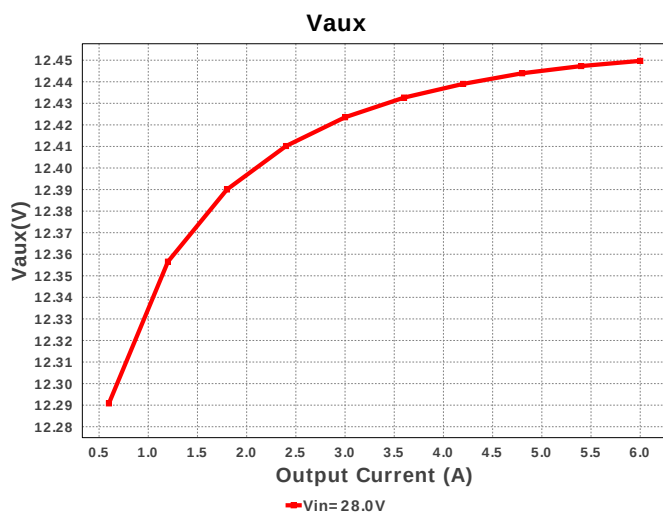
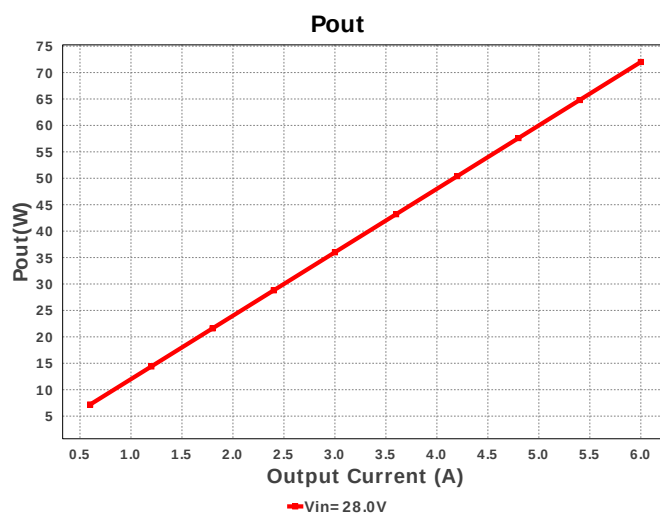
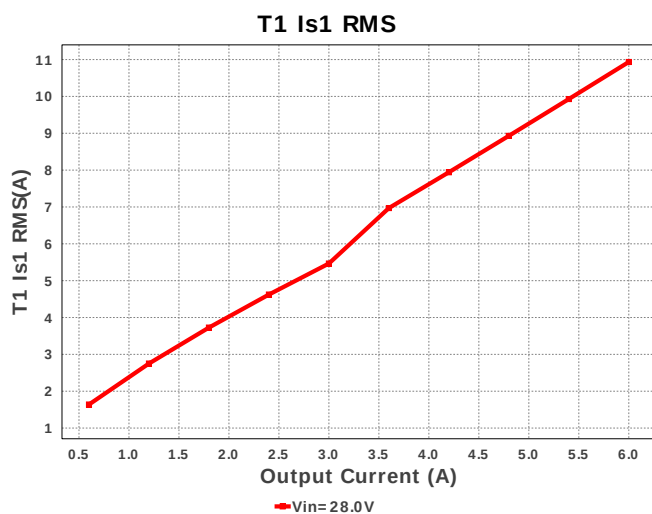
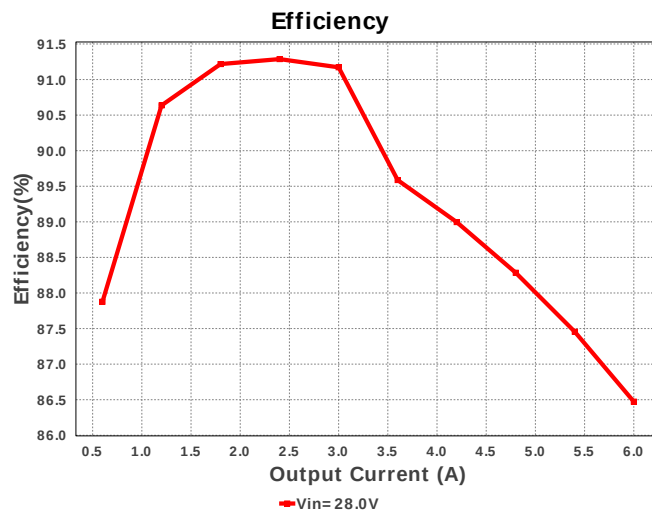
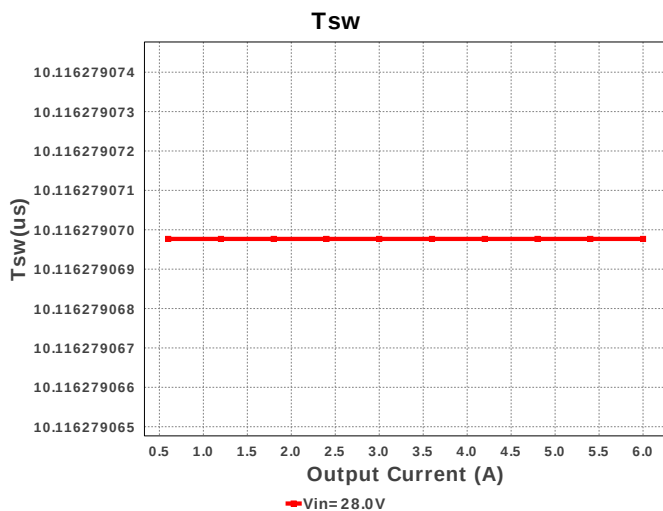
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
43.	Rt	Vishay-Dale	CRCW040217K4FKED Series= CRCW..e3	Res= 17.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
44.	Rz	Vishay-Dale	CRCW04021K10FKED Series= CRCW..e3	Res= 1.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
45.	T1	Würth Elektronik	749196540	Lp= 30.6 µH Rp= 30.0 mOhm Leakage_L= 540.0 nH Ns1toNp= 0.333 Rs1= 30.0 mOhms Ns2toNp= 0.333 Rs2= 30.0 mOhms	1	\$4.71	 EFD20 724 mm ²
46.	U1	Texas Instruments	UCC28C43DR	Switcher	1	\$0.60	 D0008A 57 mm ²
47.	VR	Texas Instruments	TL431AIDBVR	Voltage References	1	\$0.07	 R-PDSO-G3 16 mm ²

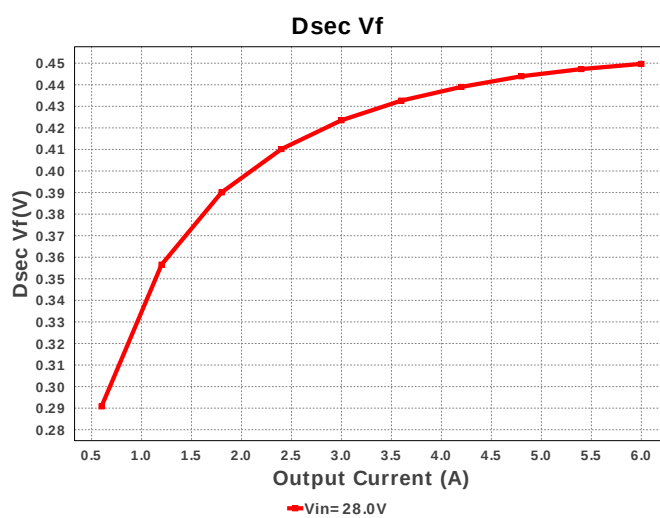
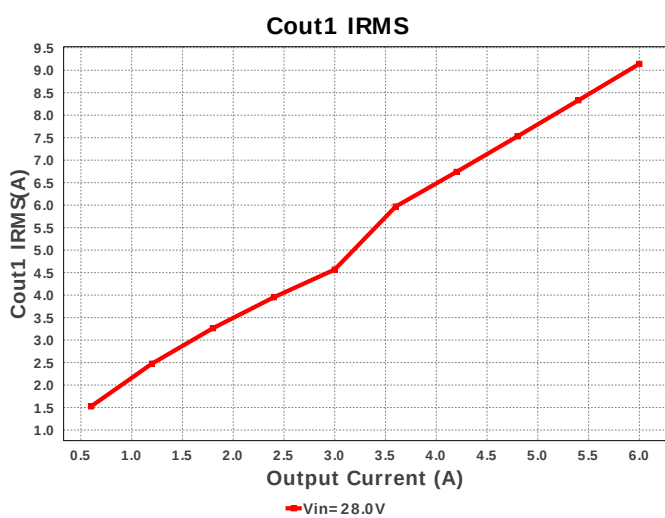
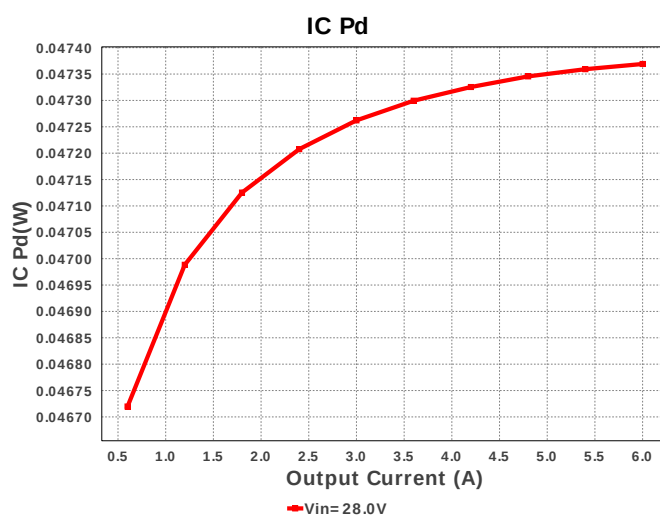
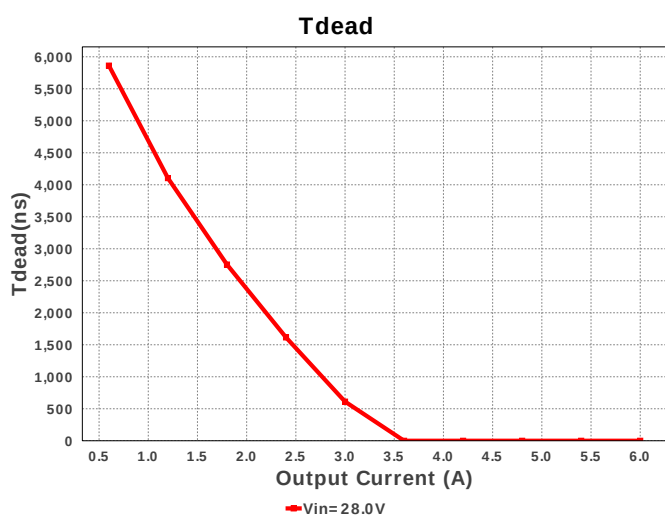
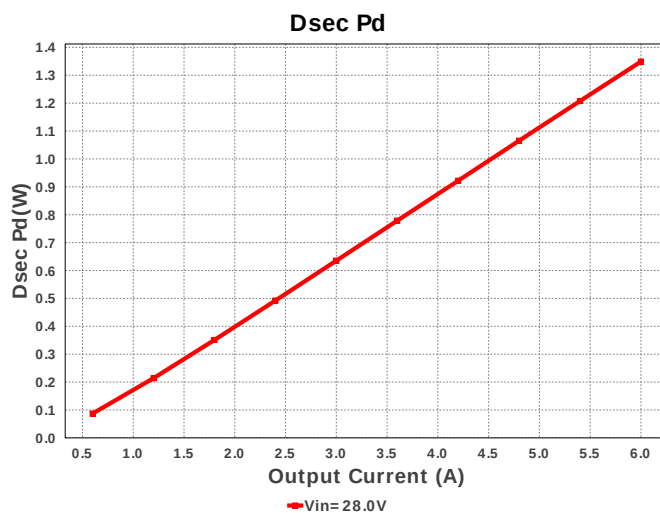
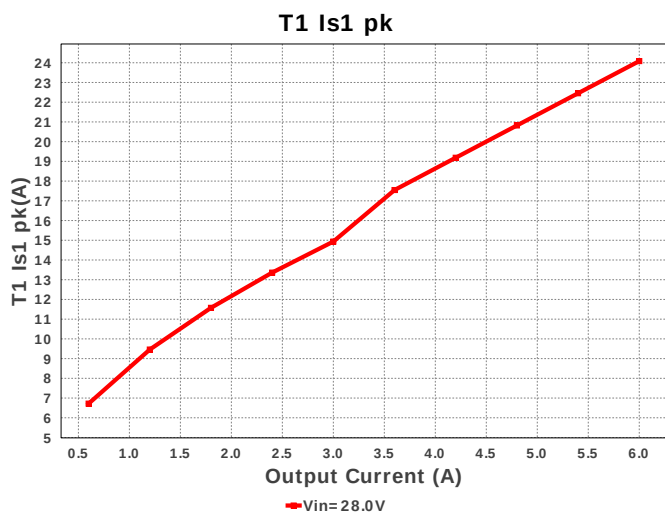


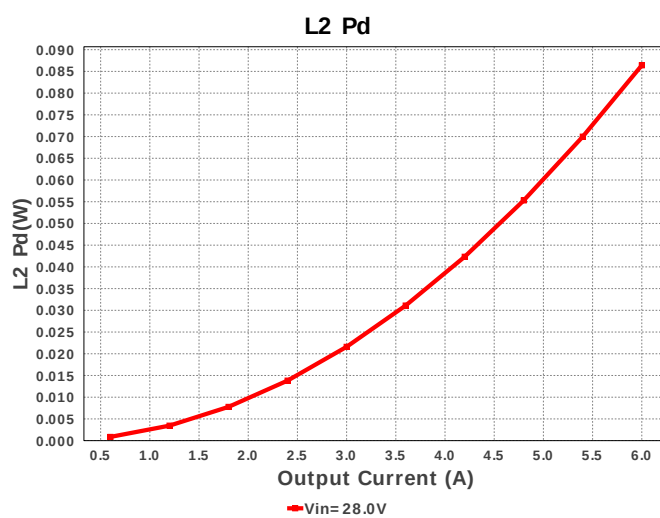
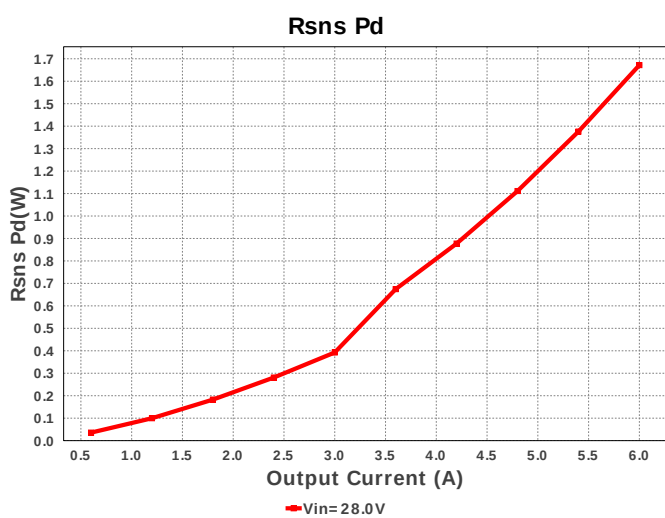
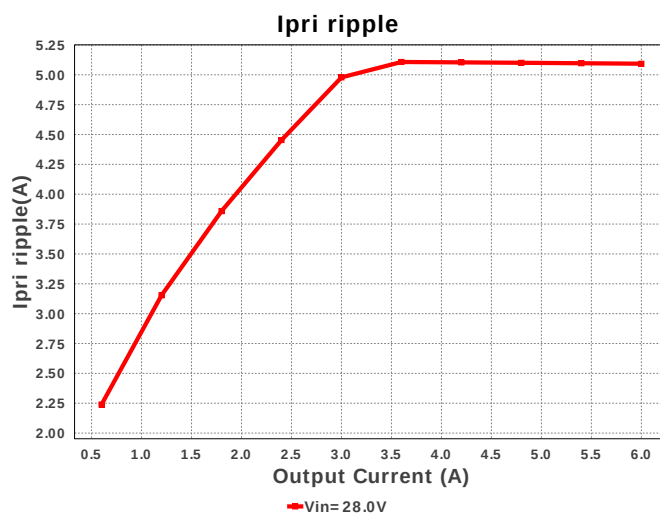
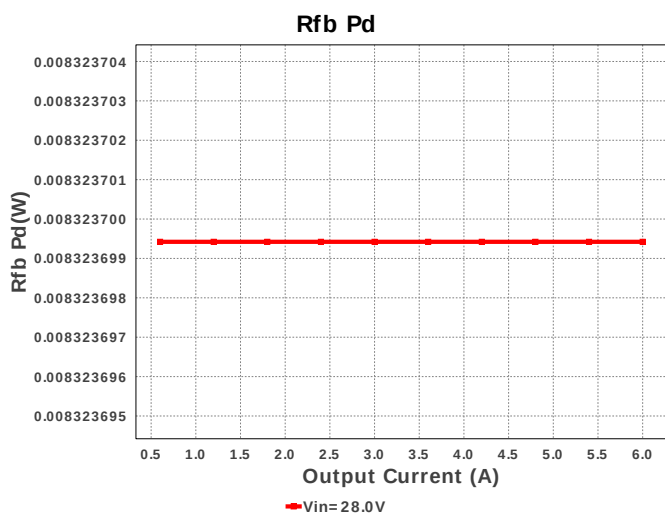
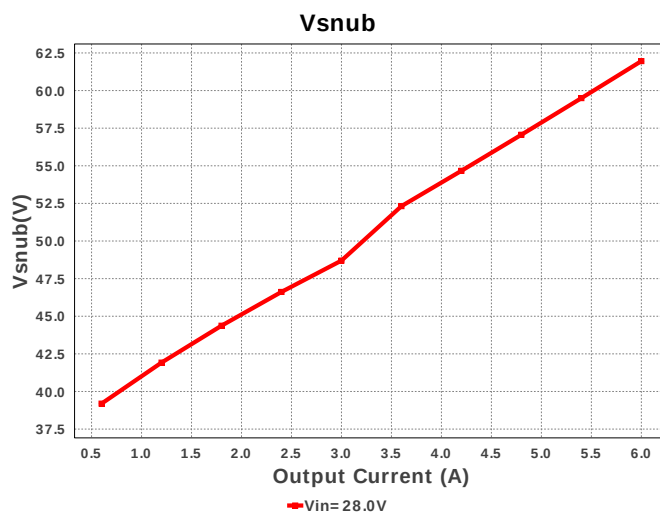
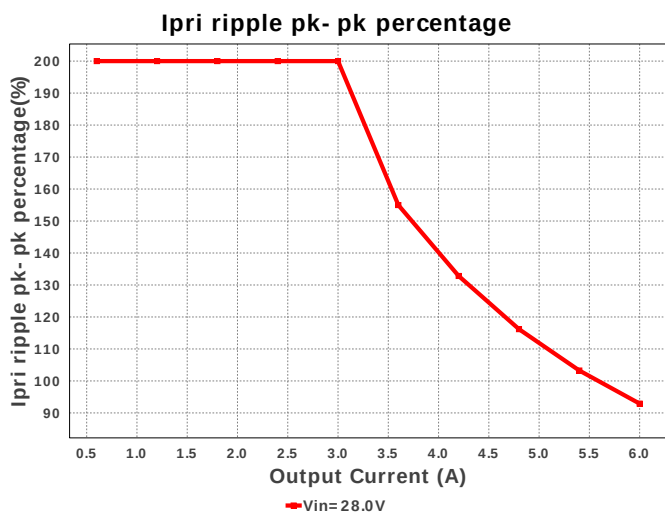


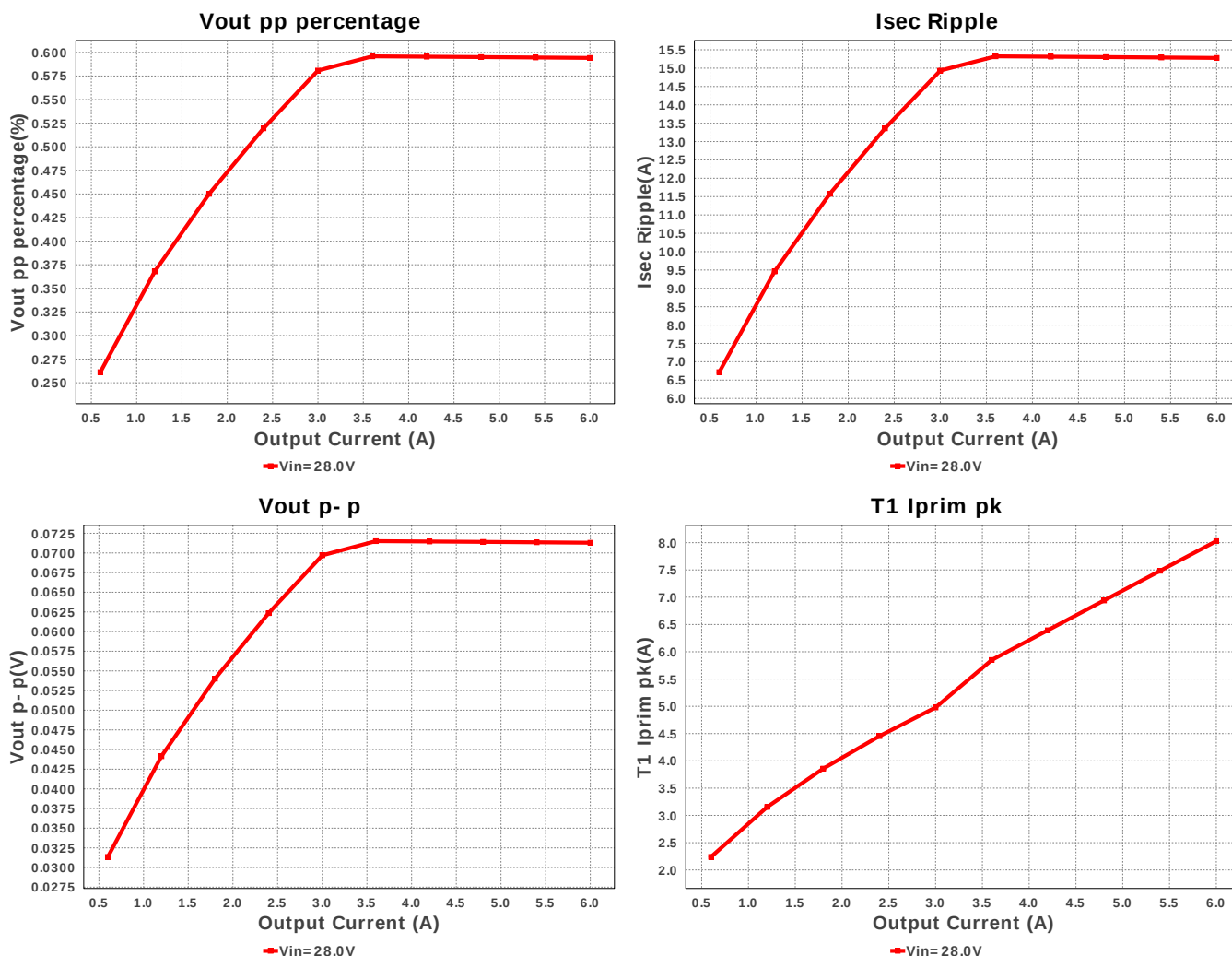












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	9.141 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	2.974 A	Current	Average input current
3.	Iout_DCM	3.365 A	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	3.221 A	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	5.093 A	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	92.908 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	15.278 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	4.35 A	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	8.028 A	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	10.934 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	24.084 A	Current	Transformer Secondary1 Peak Current
12.	BOM Count	55	General	Total Design BOM count
13.	Daux trr	4.0 ns	General	Auxiliary Diode Reverse Recovery Time
14.	Dsec Vf	449.693 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	449.693 mV	General	Effective Forward Voltage Drop at the Operating Current
17.	Dsnub trr	16.7 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	3.473 k mm ²	General	Total Foot Print Area of BOM components
19.	Frequency	98.851 kHz	General	Switching frequency
20.	Pout	72.0 W	General	Total output power
21.	Tdead	0.0 ns	General	Approximate Dead Time of the Regulator
22.	Toff	3.691 us	General	Approximate Converter Off Time
23.	Ton Act	5.944 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	12.45 V	General	Auxiliary Voltage
27.	Vsnub	61.958 V	General	Voltage Across the Snubber
28.	Vout Actual	11.99 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
29.	Vout OP	12.0 V	Op_Point	Operational Output Voltage

#	Name	Value	Category	Description
30.	Duty Cycle	58.755 %	Op_point	Duty cycle
31.	Efficiency	86.473 %	Op_point	Steady state efficiency
32.	IC Tj	32.368 degC	Op_point	IC junction temperature
33.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
34.	IOUT_OP	6.0 A	Op_point	Iout operating point
35.	M1 TJOP	139.395 degC	Op_point	M1 MOSFET junction temperature
36.	Vout p-p	71.299 mV	Op_point	Peak-to-peak output ripple voltage
37.	Cin Pd	101.208 mW	Power	Input capacitor power dissipation
38.	Cout1 Pd	389.956 mW	Power	Output capacitor1 power dissipation
39.	Dsec Pd	1.349 W	Power	Secondary Diode Power Dissipation
40.	Dsec2 Pd	1.349 W	Power	Secondary Diode Power Dissipation
41.	IC Pd	47.369 mW	Power	IC power dissipation
42.	L2 Pd	86.4 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
43.	M1 Pd	2.064 W	Power	M1 MOSFET total power dissipation
44.	Paux	21.815 mW	Power	Power Dissipation in Raux and Daux
45.	Pd Rstartup	17.76 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
46.	Rdrv Pd	7.319 μ W	Power	Power Dissipation in Gate Drive Resistor
47.	Rfb Pd	8.324 mW	Power	Rfb Power Dissipation
48.	Rsns Pd	1.672 W	Power	Current Limit Sense Resistor Power Dissipation
49.	Snubber Pd	1.178 W	Power	Snubber Power Dissipation
50.	T1 Pd	8.309 W	Power	Estimated Losses in Transformer
51.	Total Pd	0.0 W	Power	Total Power Dissipation
52.	Vout Tolerance	1.926 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
53.	Vout pp percentage	594.158 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	6.0	Maximum Output Current
2.	VinMax	28.0	Maximum input voltage
3.	VinMin	28.0	Minimum input voltage
4.	Vout	12.0	Output Voltage
5.	base_pn	UCC28C43	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **UCC28C43** Product Folder : <http://www.ti.com/product/UCC28C43> : contains the data sheet and other resources.

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