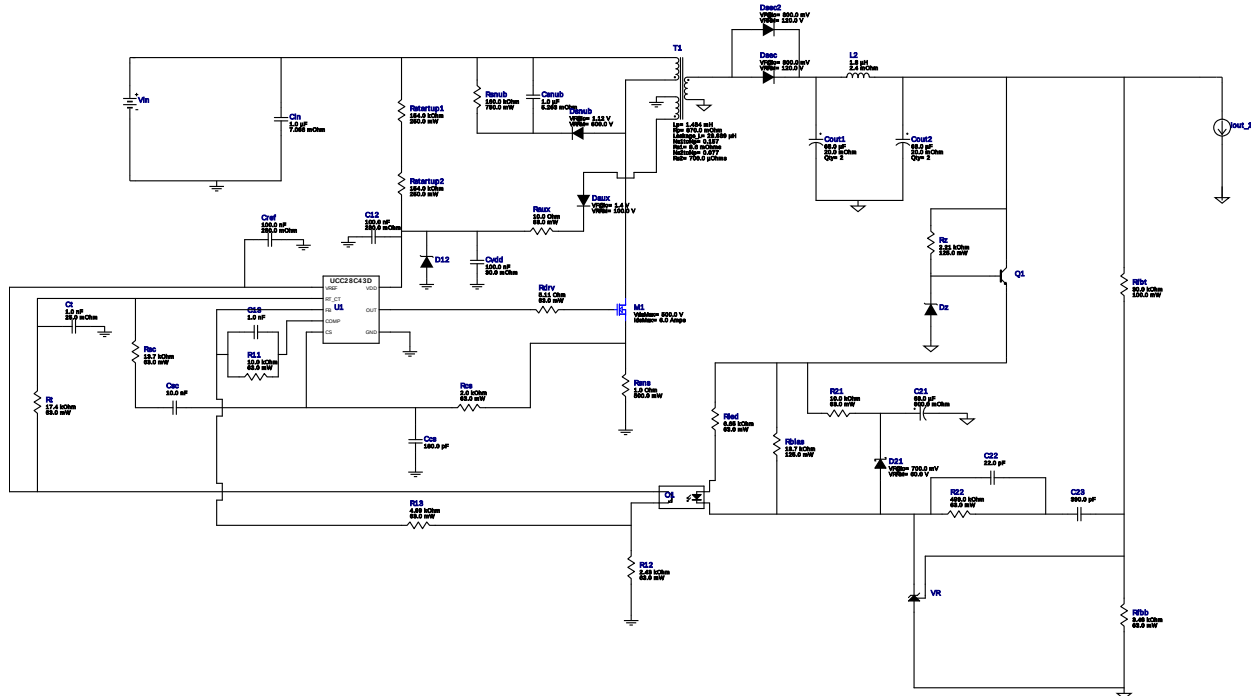


WEBENCH® Design Report

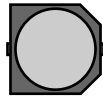
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UCC28C43DR 110.0V-115.0V to 24.00V @ 1.0A

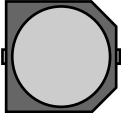
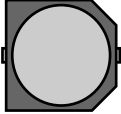
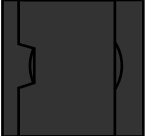


My Comments

No comments

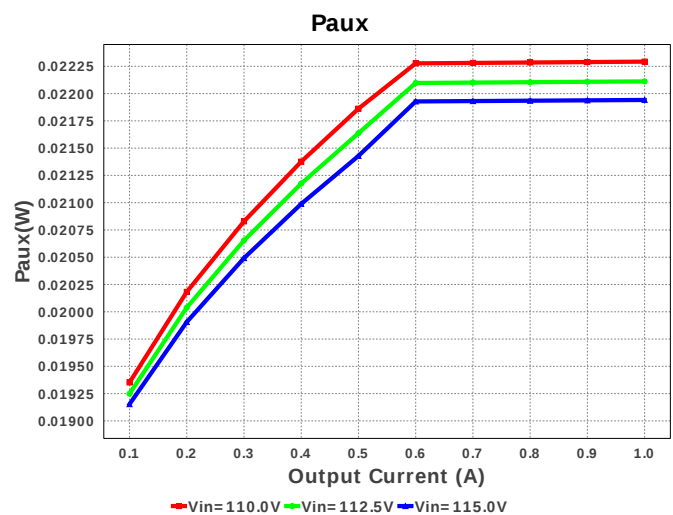
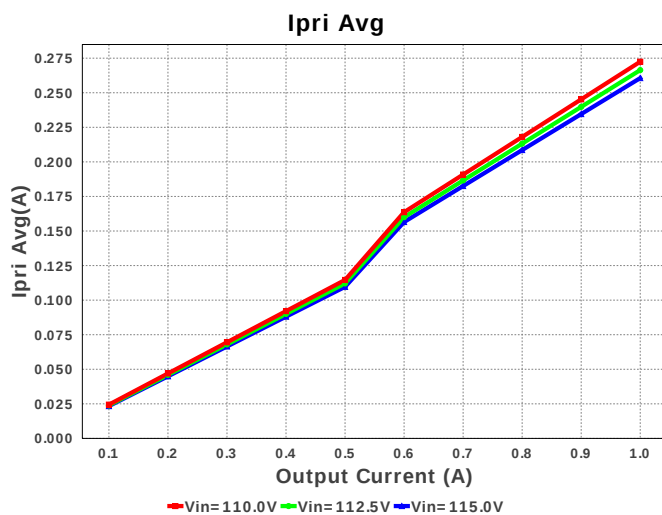
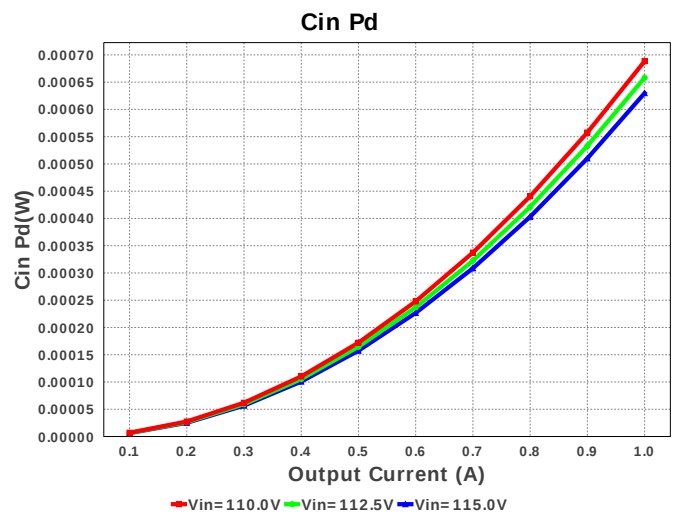
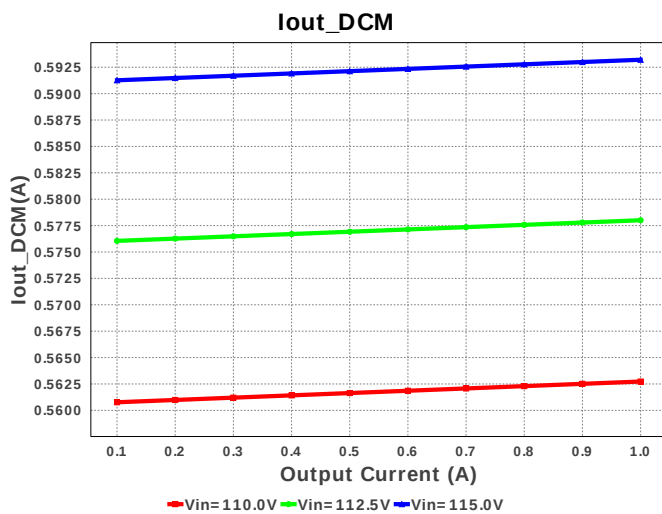
Electrical BOM

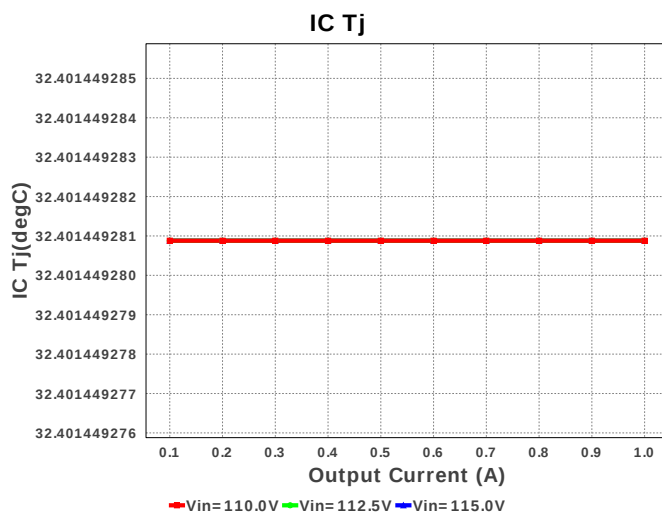
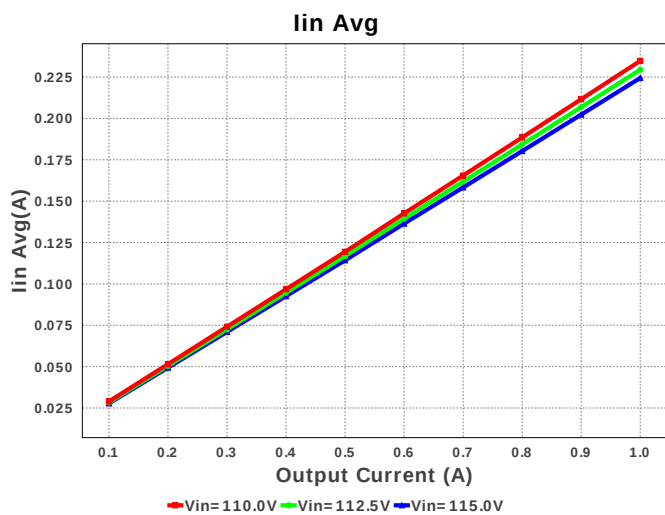
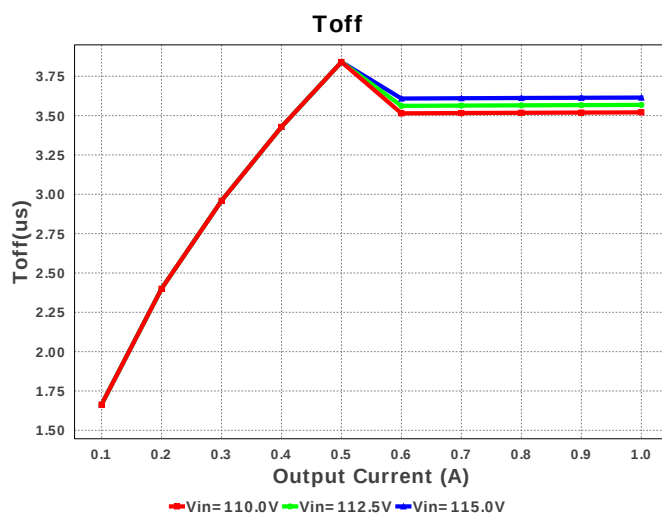
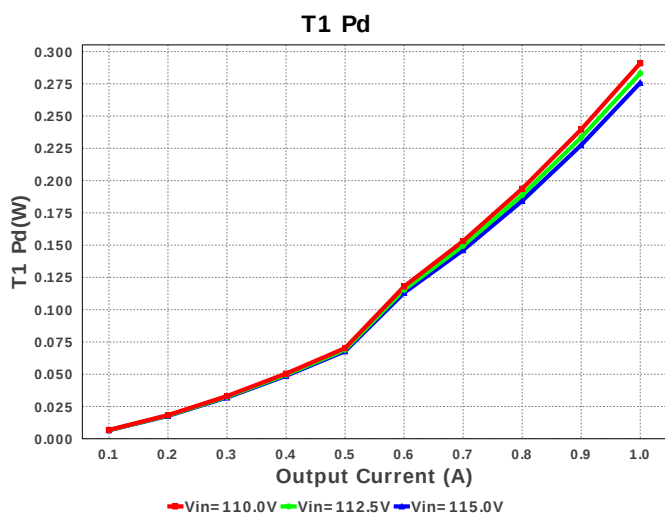
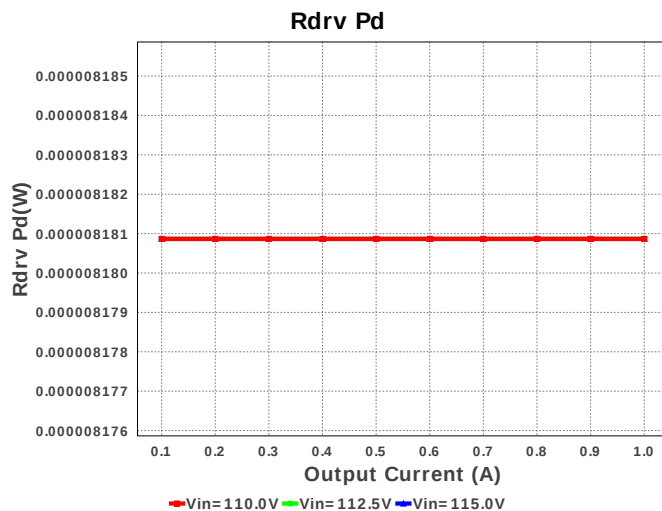
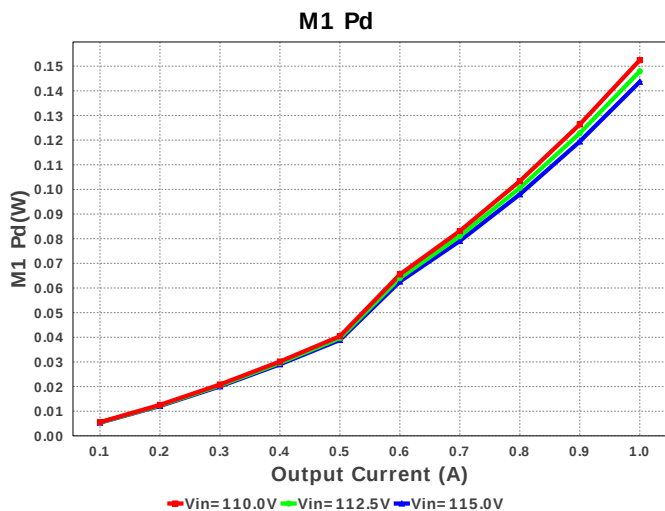
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1.	C12	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	C13	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	C21	Chemi-Con	EMVY500ADA680MHA0G Series= MVY	Cap= 68.0 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	Yageo America	CC0805KRX7R9BB391 Series= X7R	Cap= 390.0 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	GRM55DR72E105KW01L Series= X7R	Cap= 1.0 uF ESR= 7.086 mOhm VDC= 250.0 V IRMS= 2.0605 A	1	\$0.26	 2220_200 54 mm ²

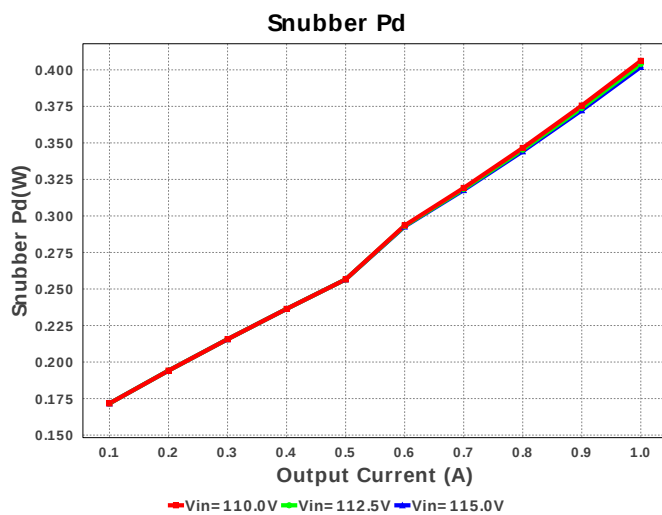
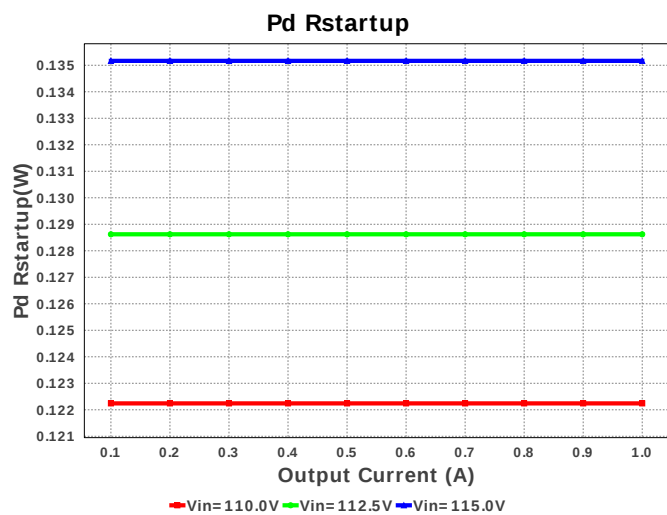
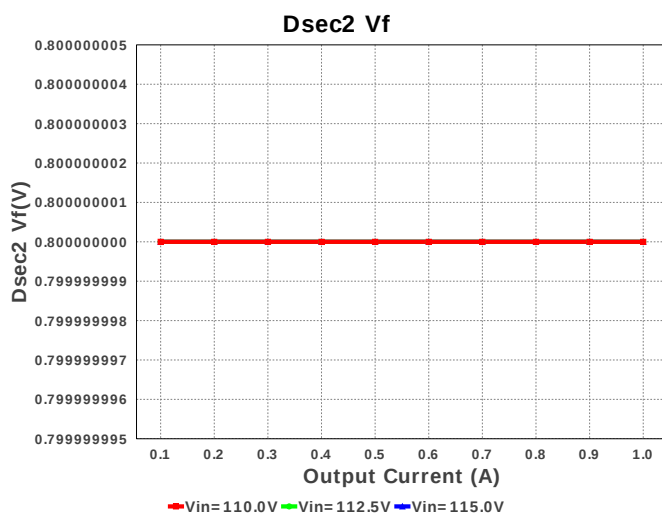
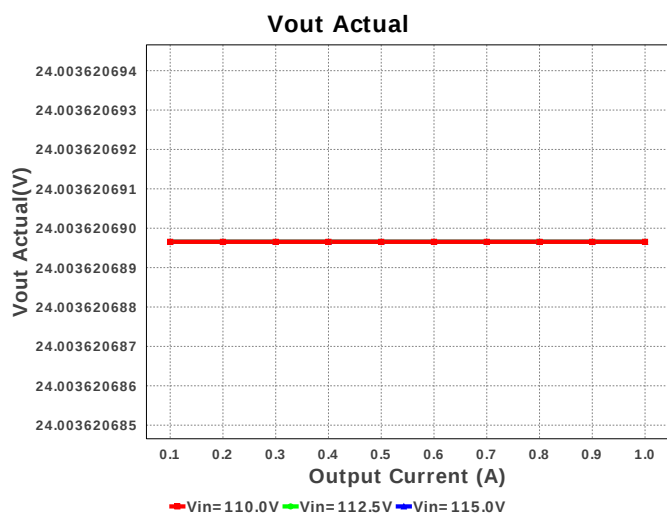
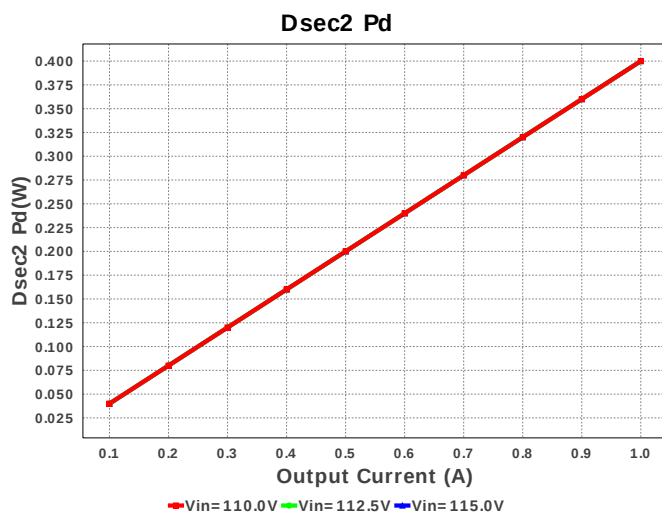
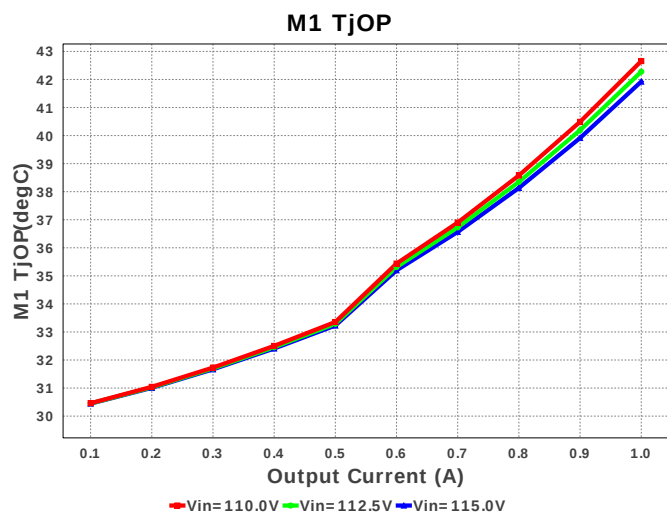
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8.	Cout1	Panasonic	50SVPF68M Series= ?	Cap= 68.0 uF ESR= 20.0 mOhm VDC= 50.0 V IRMS= 4.3 A	2	\$0.92	 CAPSMT_62_F12 151 mm²
9.	Cout2	Panasonic	50SVPF68M Series= ?	Cap= 68.0 uF ESR= 20.0 mOhm VDC= 50.0 V IRMS= 4.3 A	2	\$0.92	 CAPSMT_62_F12 151 mm²
10.	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	TDK	C5750X6S2W105K Series= X6S	Cap= 1.0 uF ESR= 5.263 mOhm VDC= 400.0 V IRMS= 0.0 A	1	\$1.19	 2220 54 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.	B160-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	\$0.06	 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	Fairchild Semiconductor	FSV10120V	VF@Io= 800.0 mV VRRM= 120.0 V	1	\$0.21	 TO-277A 56 mm²
19.	Dsec2	Fairchild Semiconductor	FSV10120V	VF@Io= 800.0 mV VRRM= 120.0 V	1	\$0.21	 TO-277A 56 mm²
20.	Dsnub	Bourns	CD214C-F3600	VF@Io= 1.12 V VRRM= 600.0 V	1	\$0.18	 SMC 83 mm²
21.	Dz	Diodes Inc.	MMSZ5250B-7-F	Zener	1	\$0.03	 SOD-123 13 mm²
22.	L2	Coilcraft	SER1360-182KLB	L= 1.8 uH DCR= 2.4 mOhm	1	\$0.72	 SER1360 225 mm²
23.	M1	Fairchild Semiconductor	FDD6N50TM	VdsMax= 500.0 V IdsMax= 6.0 Amps	1	\$0.47	 DPAK 102 mm²

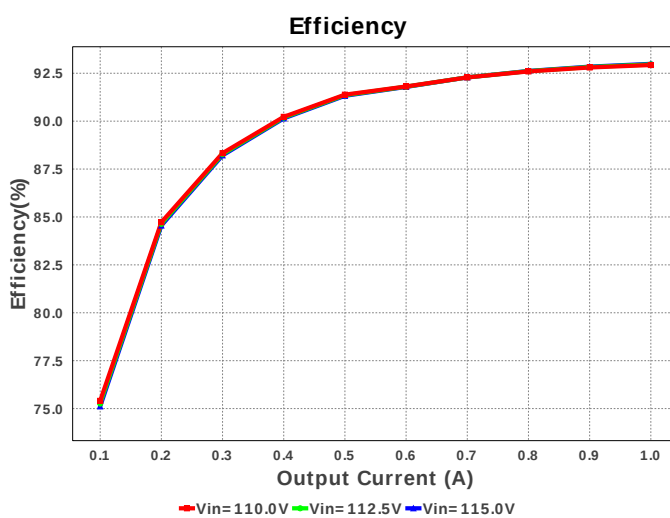
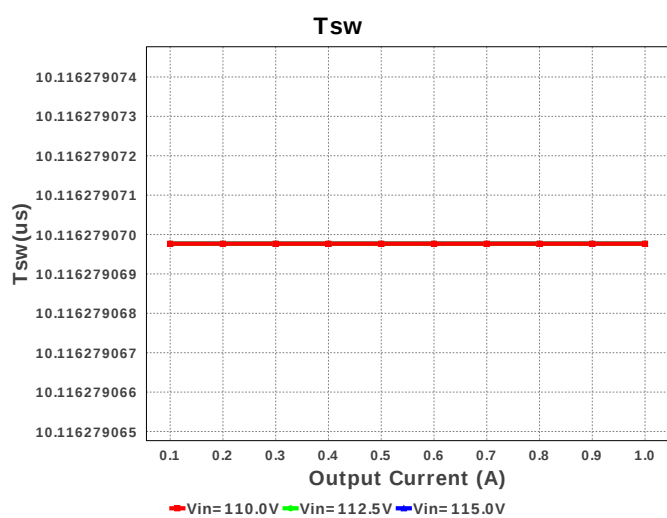
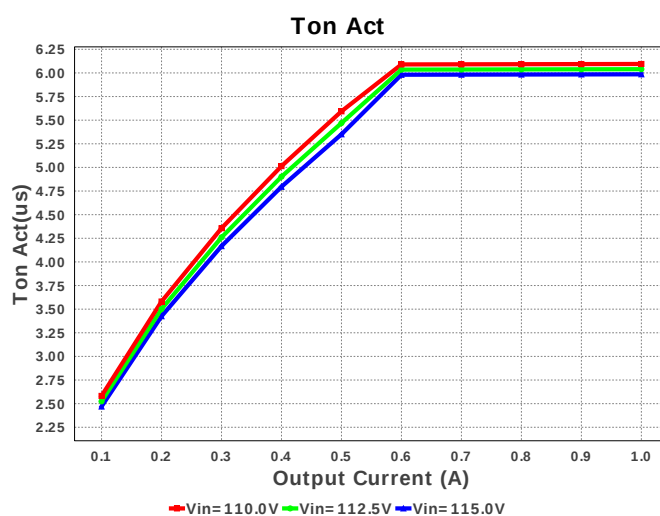
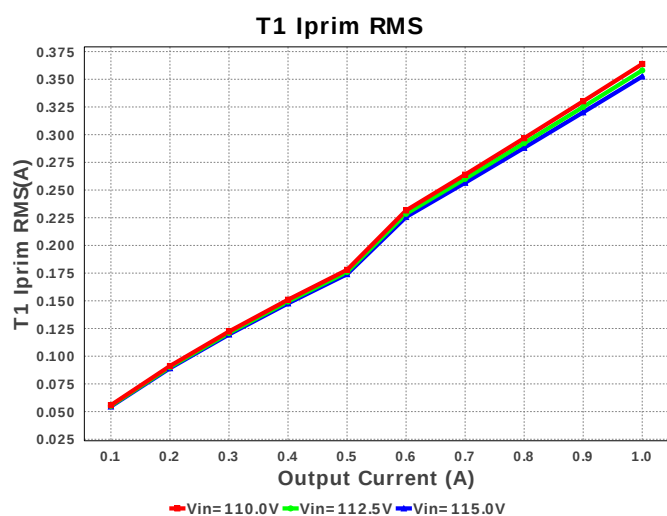
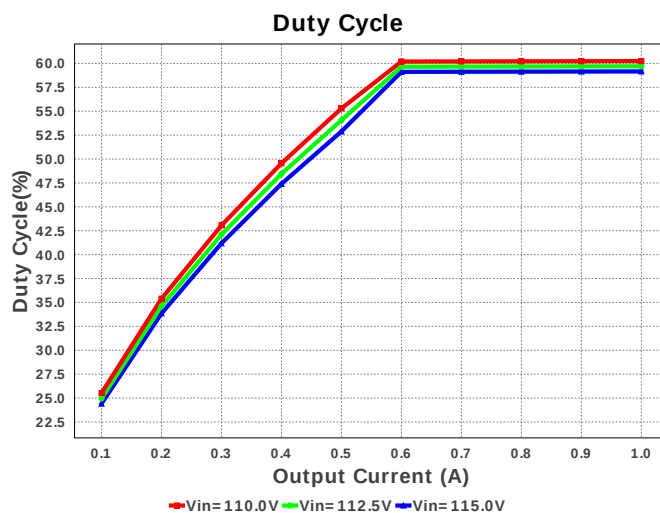
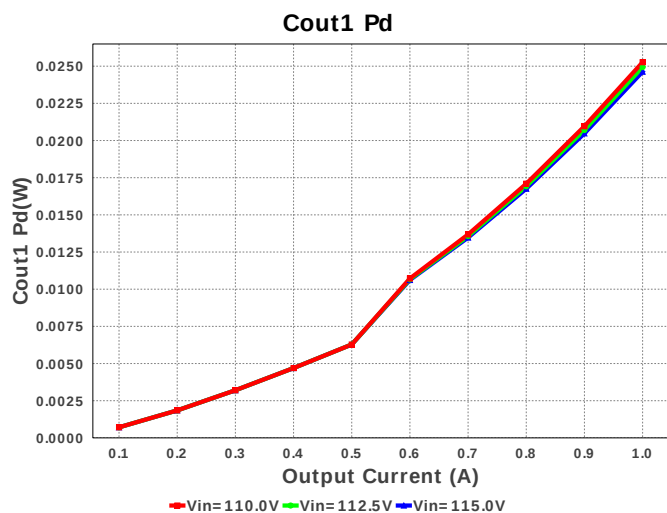
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
24.	O1	Vishay-Semiconductor	TCMT1107	Optocoupler	1	\$0.21	 SOP-4 44 mm ²
25.	Q1	ON Semiconductor	BC846BLT1G	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm ²
26.	R11	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
27.	R12	Vishay-Dale	CRCW04022K43FKED Series= CRCW..e3	Res= 2.43 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	CRCW0402499KFKED Series= CRCW..e3	Res= 499.0 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	CRCW04025R11FKED Series= CRCW..e3	Res= 5.11 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	CRCW04026K65FKED Series= CRCW..e3	Res= 6.65 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
38.	Rsc	Vishay-Dale	CRCW040213K7FKED Series= CRCW..e3	Res= 13.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
39.	Rsns	Stackpole Electronics Inc	CSR1206FT1R00 Series= ?	Res= 1.0 Ohm Power= 500.0 mW Tolerance= 1.0%	1	\$0.04	 1206 11 mm ²
40.	Rsns	Vishay-Dale	CRCW2010160KFKEF Series= ?	Res= 160.0 kOhm Power= 750.0 mW Tolerance= 1.0%	1	\$0.03	 2010 32 mm ²
41.	Rstartup1	Panasonic	ERJ-8ENF1543V Series= ERJ-8E	Res= 154.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
42.	Rstartup2	Panasonic	ERJ-8ENF1543V Series= ERJ-8E	Res= 154.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
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	Panasonic	ERJ-6ENF2211V Series= ERJ-6E	Res= 2.21 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²

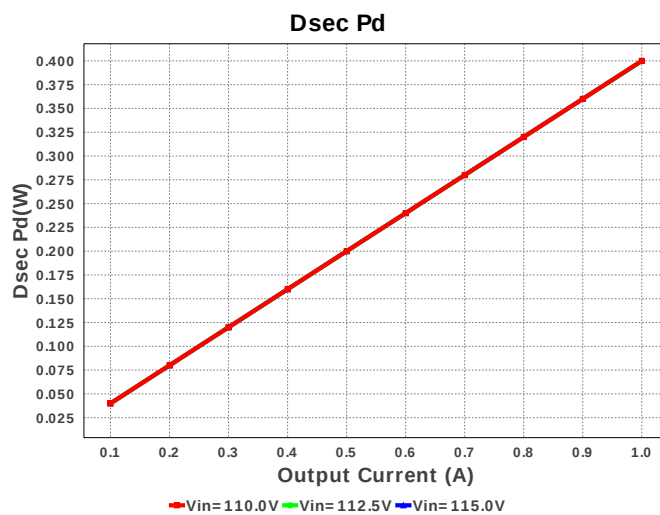
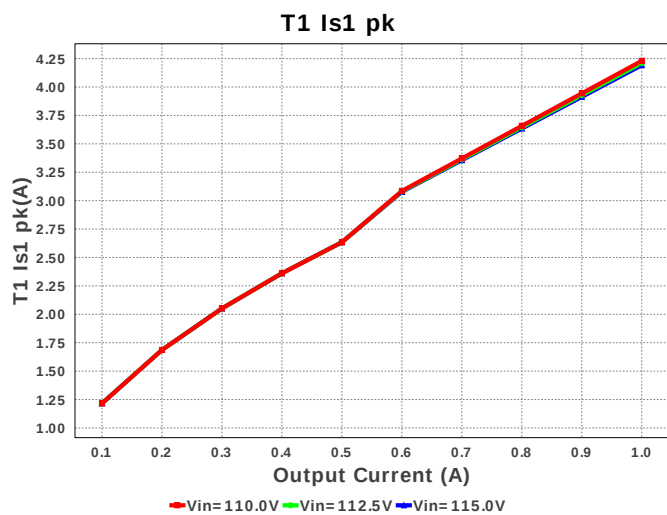
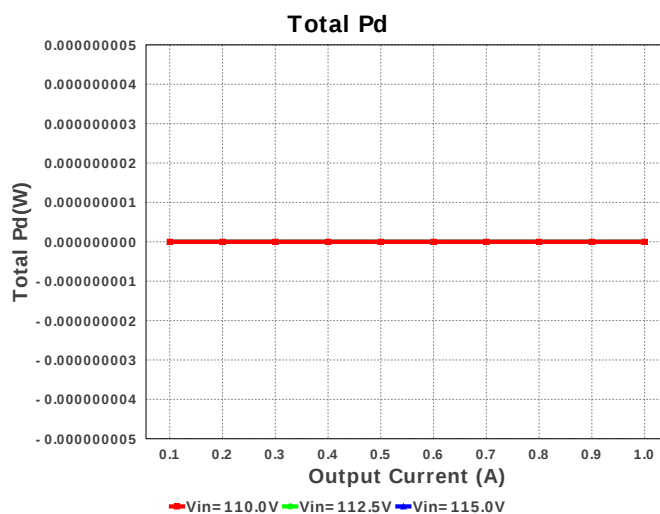
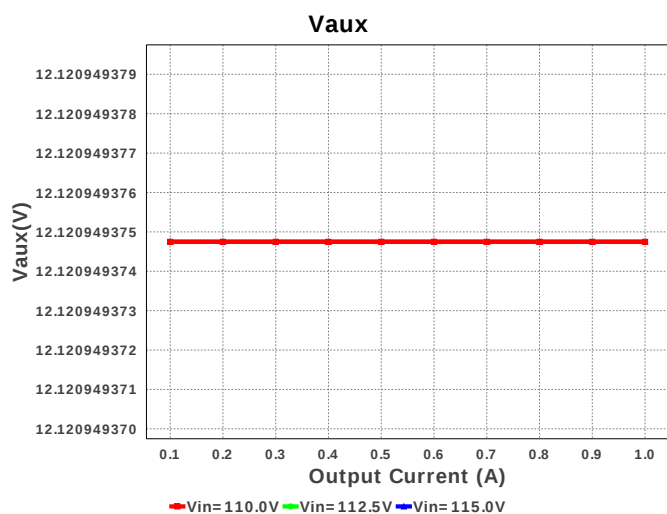
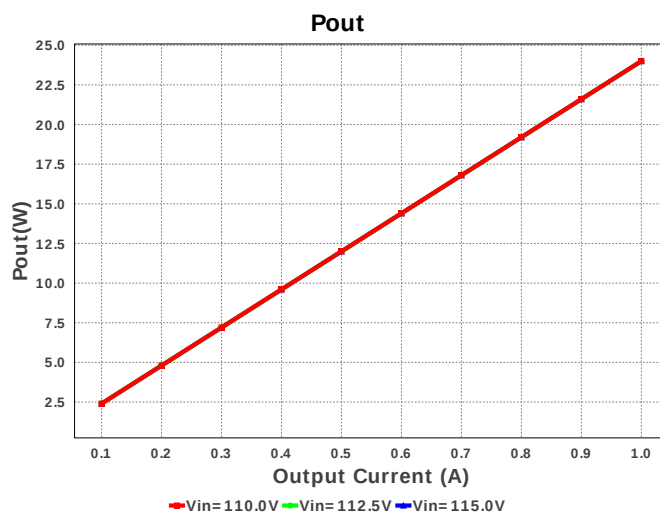
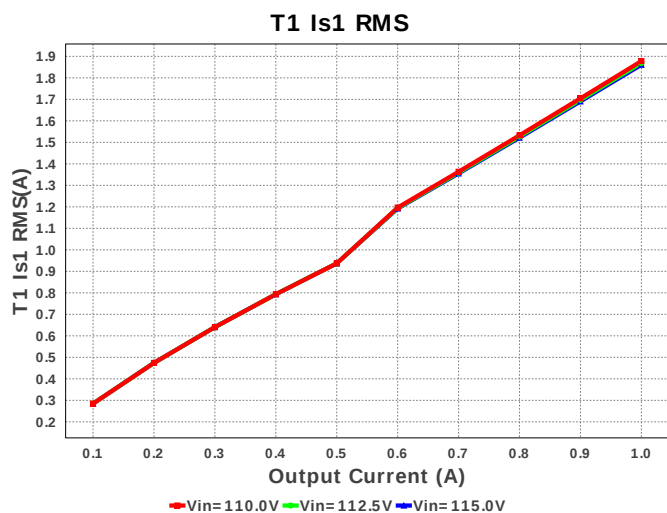
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
45.	T1	CUSTOM	CUSTOM	Lp= 1.484 mH Rp= 870.0 mOhm Leakage_L= 29.689 μ H Ns1toNp= 0.157 Rs1= 8.6 mOhms Ns2toNp= 0.077 Rs2= 700.0 μ Ohms	1	NA	CUSTOM 0 mm ²
46.	U1	Texas Instruments	UCC28C43DR	Switcher	1	\$0.60	 D0008A 57 mm ²
47.	VR	Texas Instruments	TL431AIDBZR	Voltage References	1	\$0.08	 DBZ0003A 14 mm ²

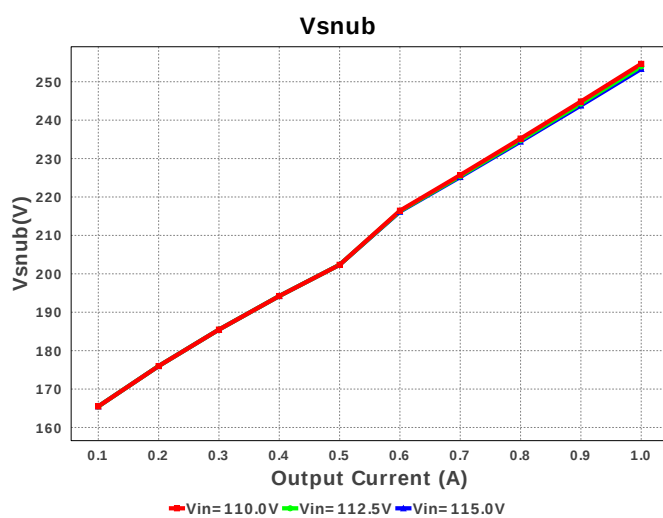
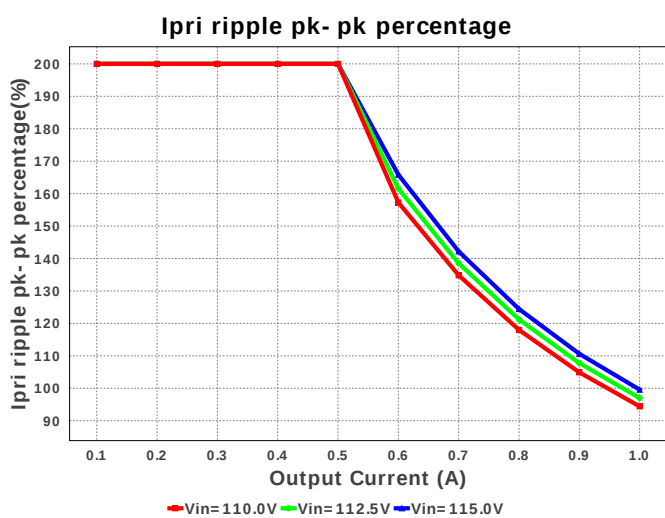
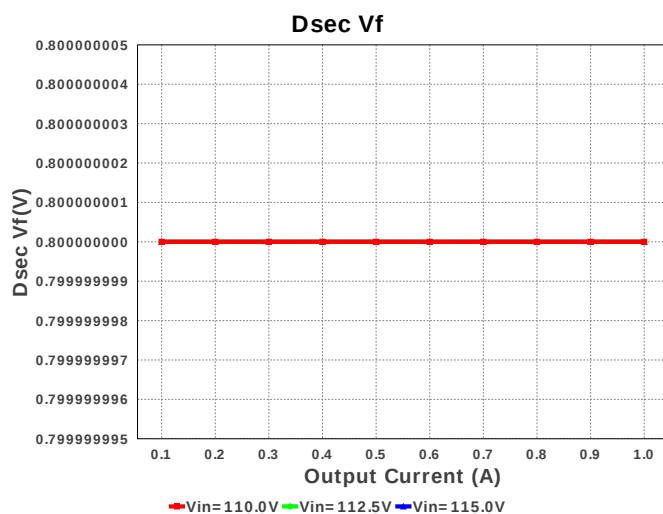
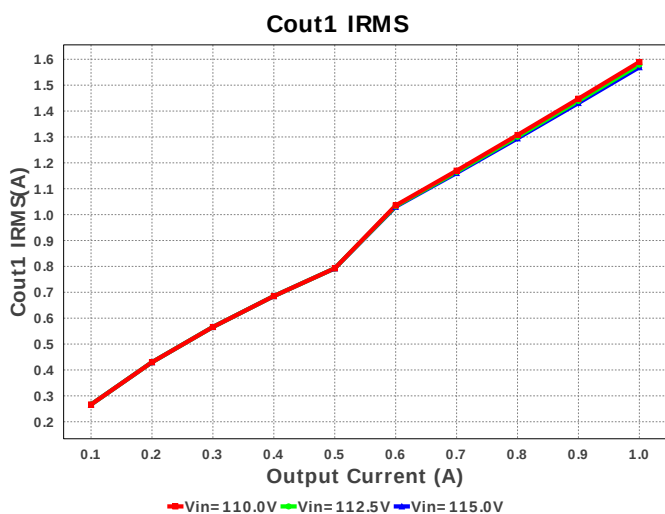
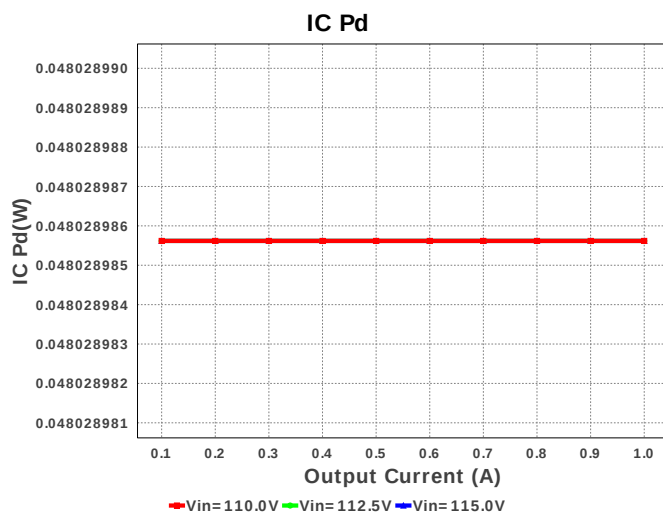
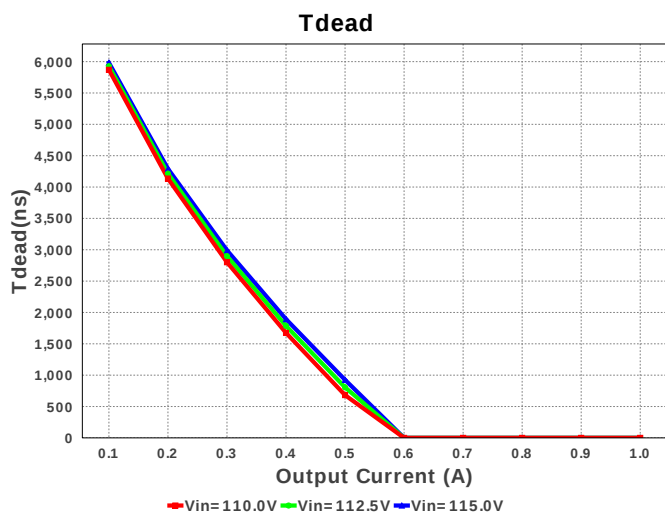


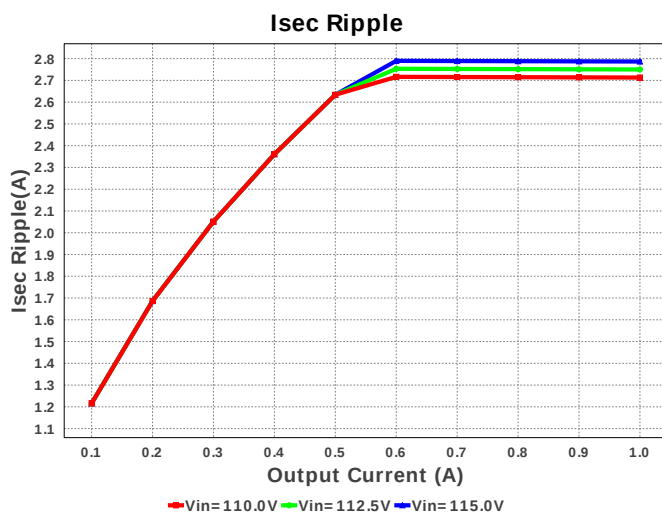
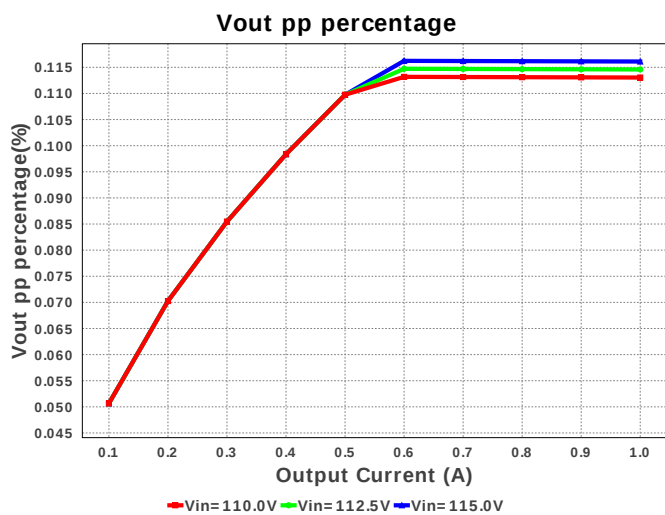
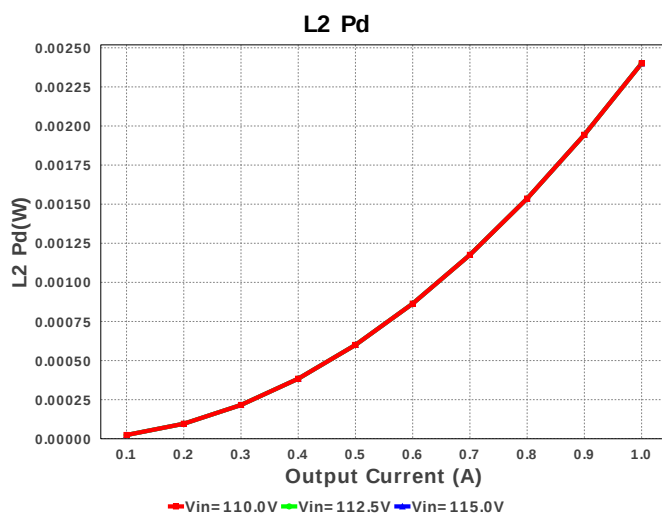
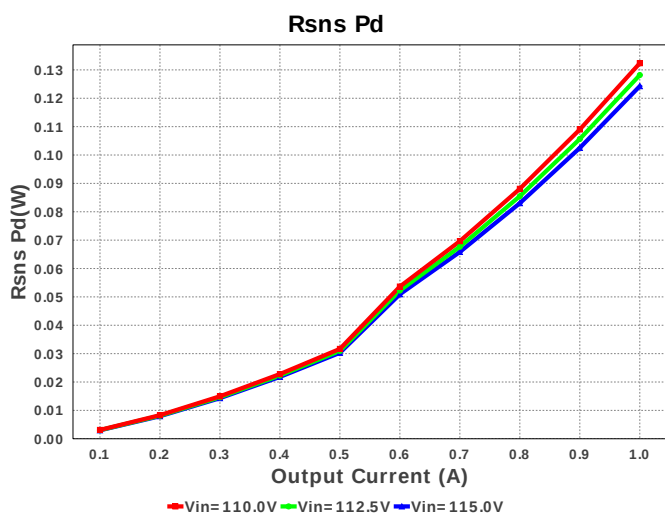
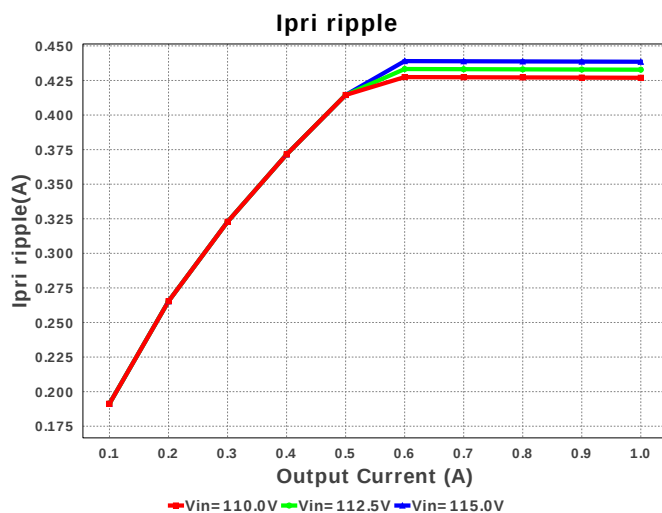
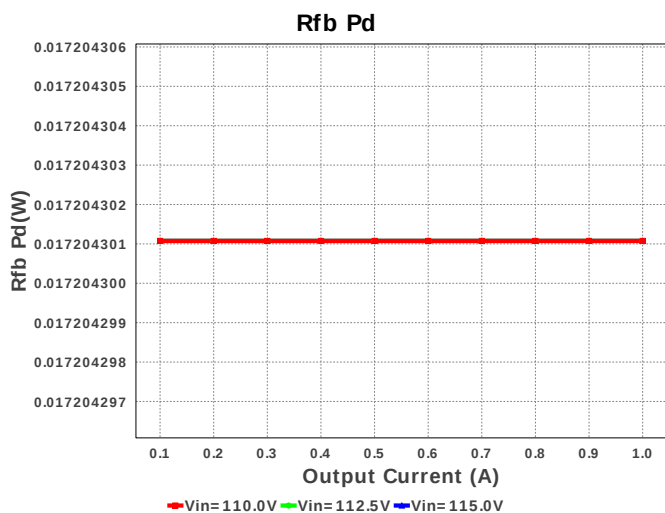


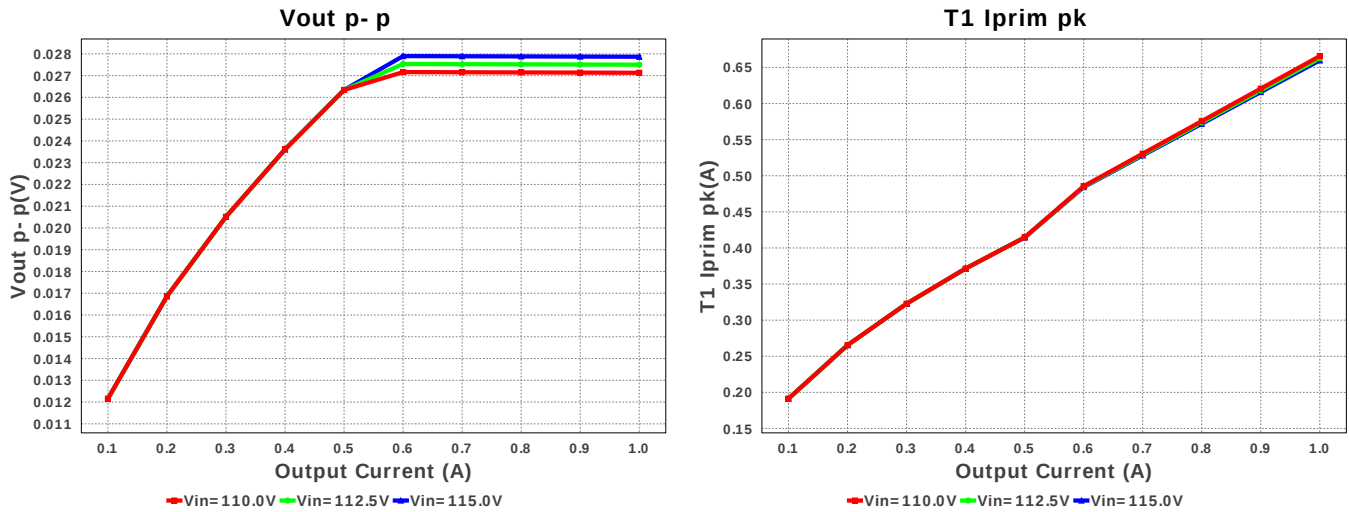












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	1.59 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	234.783 mA	Current	Average input current
3.	Iout_DCM	562.731 mA	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	272.441 mA	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	426.953 mA	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	94.413 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	2.713 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	363.805 mA	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	665.695 mA	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	1.878 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	4.23 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	800.0 mV	General	Effective Forward Voltage Drop at the Operating Current
15.	Dsec trr	16.7 ns	General	Output Diode Reverse Recovery Time
16.	Dsec2 Vf	800.0 mV	General	Effective Forward Voltage Drop at the Operating Current
17.	Dsnub trr	30.0 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	1.724 k mm ²	General	Total Foot Print Area of BOM components
19.	Frequency	98.851 kHz	General	Switching frequency
20.	Mode	CCM	General	Conduction Mode
21.	Pout	24.0 W	General	Total output power
22.	Tdead	0.0 ns	General	Approximate Dead Time of the Regulator
23.	Toff	3.52 us	General	Approximate Converter Off Time
24.	Ton Act	6.095 us	General	Approximate Converter On Time
25.	Total BOM	\$0.0	General	Total BOM Cost
26.	Tsw	10.116 us	General	Switching Time Period
27.	Vaux	12.121 V	General	Auxiliary Voltage
28.	Vsnub	254.649 V	General	Voltage Across the Snubber
29.	Vout Actual	24.004 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
30.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
31.	Duty Cycle	60.245 %	Op_point	Duty cycle
32.	Efficiency	92.929 %	Op_point	Steady state efficiency
33.	IC Tj	32.401 degC	Op_point	IC junction temperature
34.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
35.	IOUT_OP	1.0 A	Op_point	Iout operating point
36.	M1 TjOP	42.655 degC	Op_point	M1 MOSFET junction temperature
37.	Vout p-p	27.131 mV	Op_point	Peak-to-peak output ripple voltage
38.	Cin Pd	688.402 μW	Power	Input capacitor power dissipation
39.	Cout1 Pd	25.266 mW	Power	Output capacitor1 power dissipation
40.	Dsec Pd	400.0 mW	Power	Secondary Diode Power Dissipation
41.	Dsec2 Pd	400.0 mW	Power	Secondary Diode Power Dissipation
42.	IC Pd	48.029 mW	Power	IC power dissipation
43.	L2 Pd	2.4 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
44.	M1 Pd	152.464 mW	Power	M1 MOSFET total power dissipation
45.	Paux	22.293 mW	Power	Power Dissipation in Raux and Daux
46.	Pd Rstartup	122.242 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
47.	Rdrv Pd	8.181 μW	Power	Power Dissipation in Gate Drive Resistor
48.	Rfb Pd	17.204 mW	Power	Rfb Power Dissipation
49.	Rsns Pd	132.354 mW	Power	Current Limit Sense Resistor Power Dissipation
50.	Snubber Pd	406.148 mW	Power	Snubber Power Dissipation

#	Name	Value	Category	Description
51.	T1 Pd	290.955 mW	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	113.044 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	115.0	Maximum input voltage
3.	VinMin	110.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	UCC28C43	Texas Instruments Base Part 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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