
















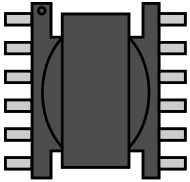




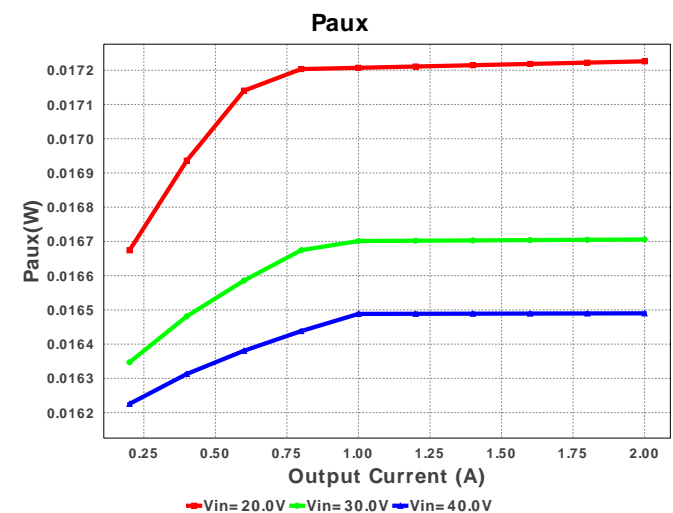
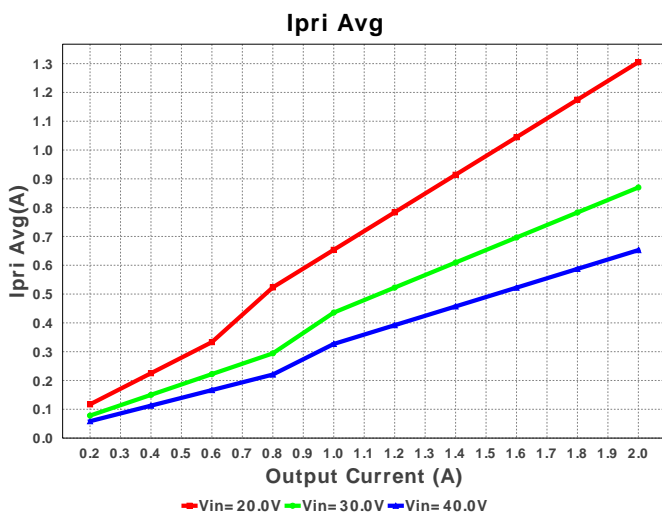
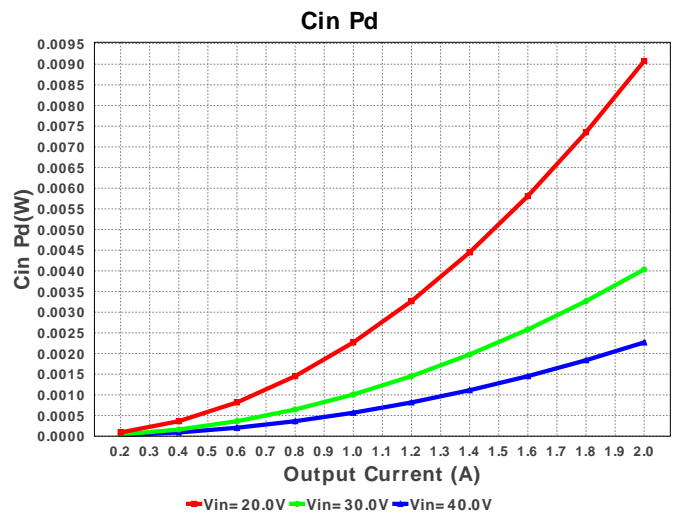
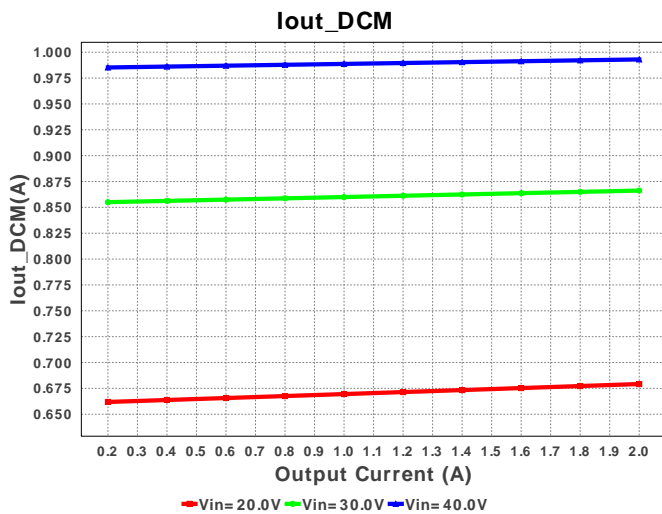
Electrical BOM

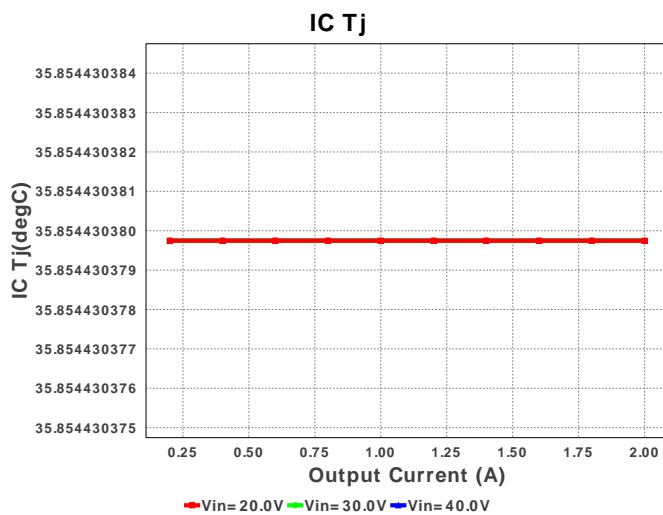
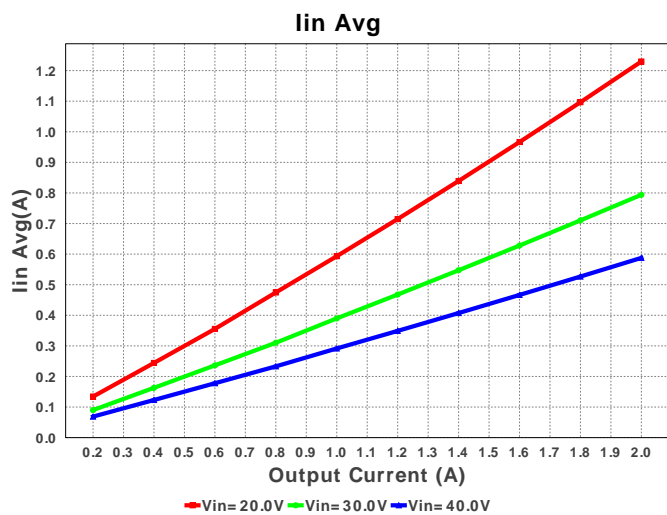
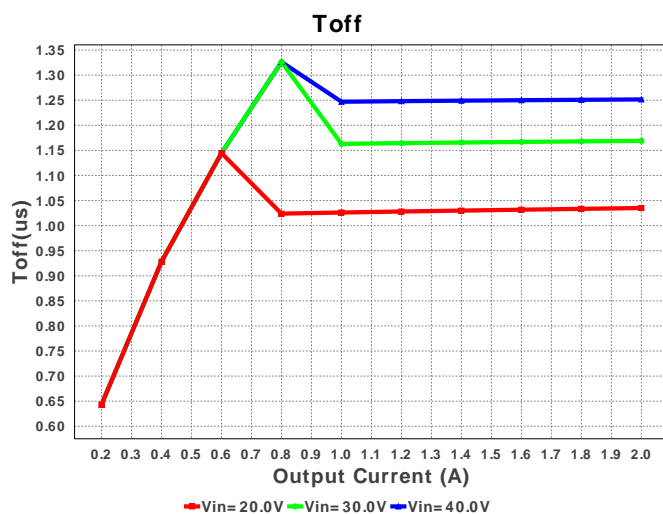
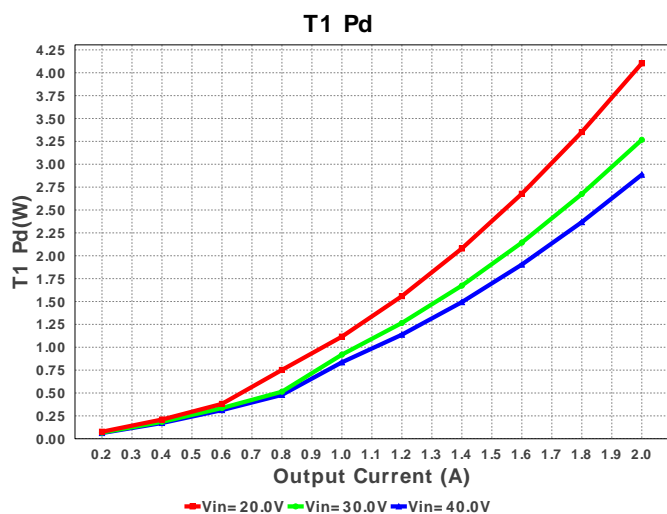
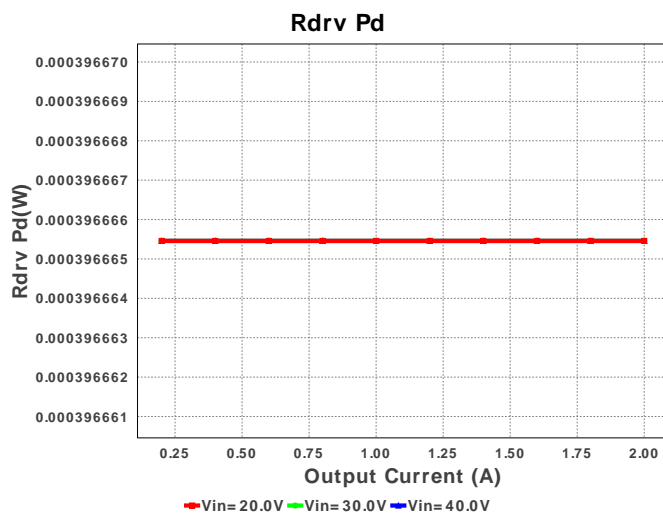
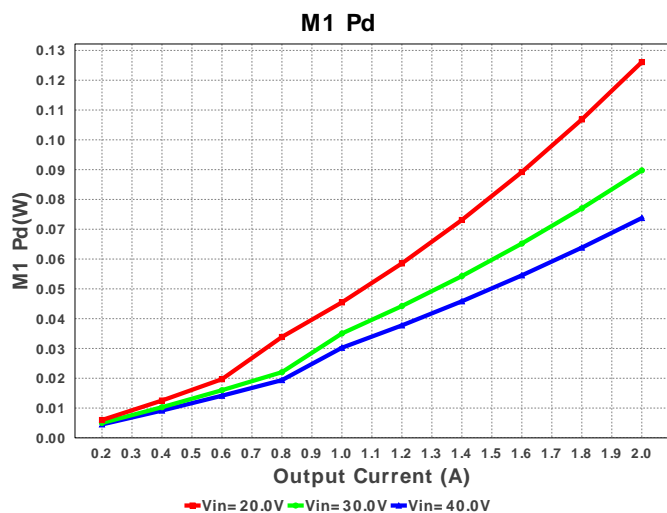
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1.	C12	MuRata	GRM155R61C104KA88D Series= X5R	Cap= 100.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	C13	MuRata	GRM033R71C102KA01D Series= X7R	Cap= 1.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
3.	C21	MuRata	GRM21BR61C335KA88L Series= X5R	Cap= 3.3 uF ESR= 6.587 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.05	0805 7 mm ²
4.	C22	MuRata	GRM0225C1C220JD05L Series= C0G/NP0	Cap= 22.0 pF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	01005 2 mm ²
5.	C23	MuRata	GRM033R71C391KA01D Series= X7R	Cap= 390.0 pF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
6.	Ccs	Samsung Electro-Mechanics	CL02C470JO2ANNC Series= C0G/NP0	Cap= 47.0 pF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	01005 2 mm ²
7.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	\$0.05	1206_190 11 mm ²
8.	Cout1	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	2	\$0.16	1210 15 mm ²

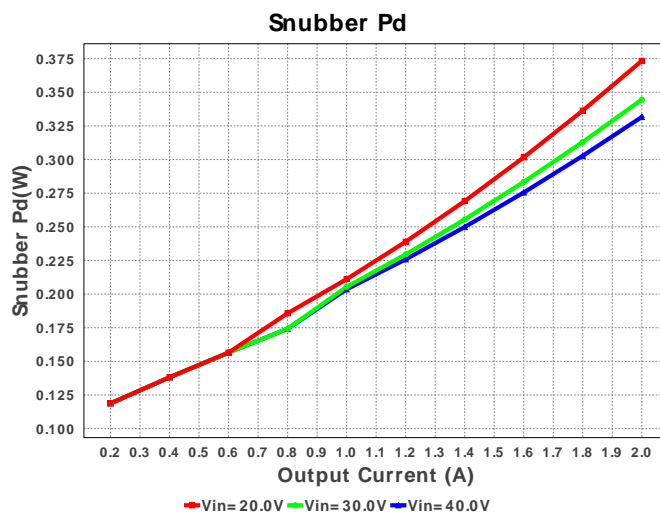
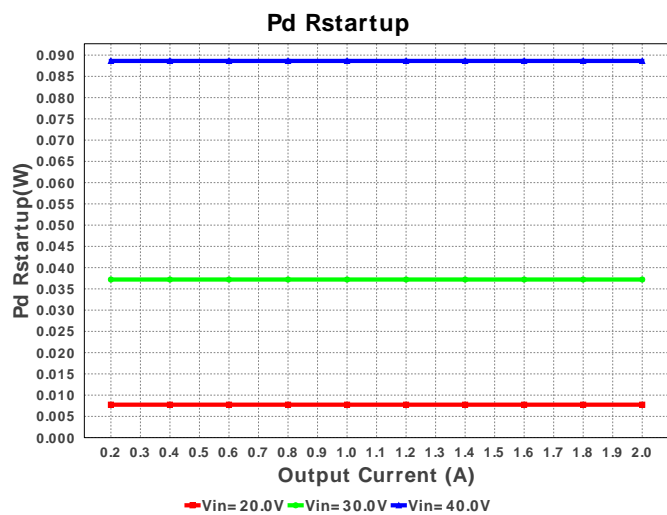
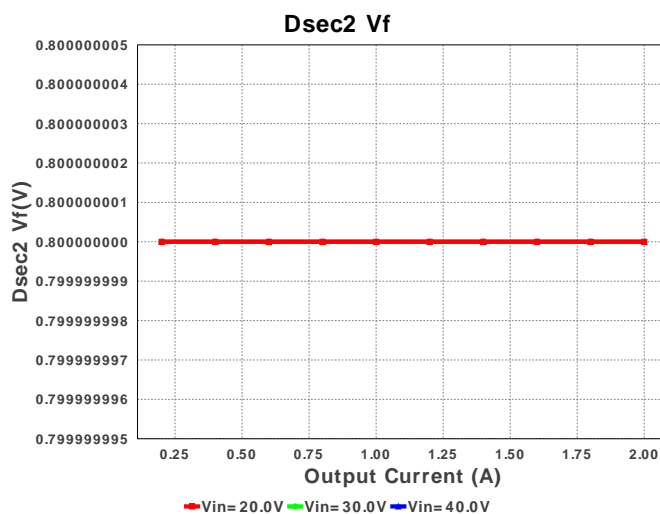
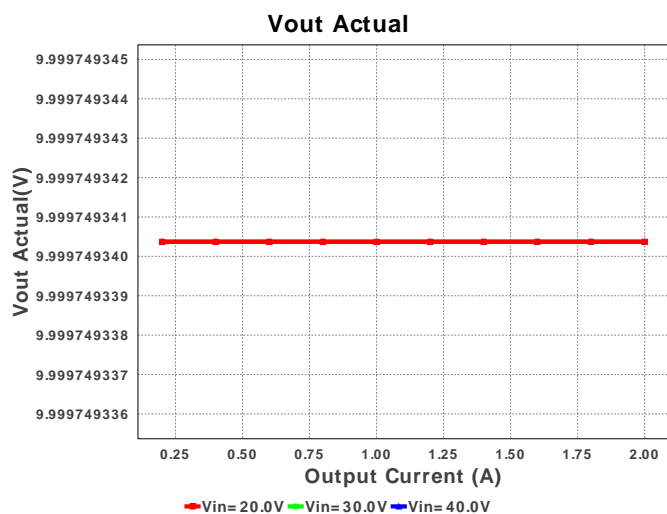
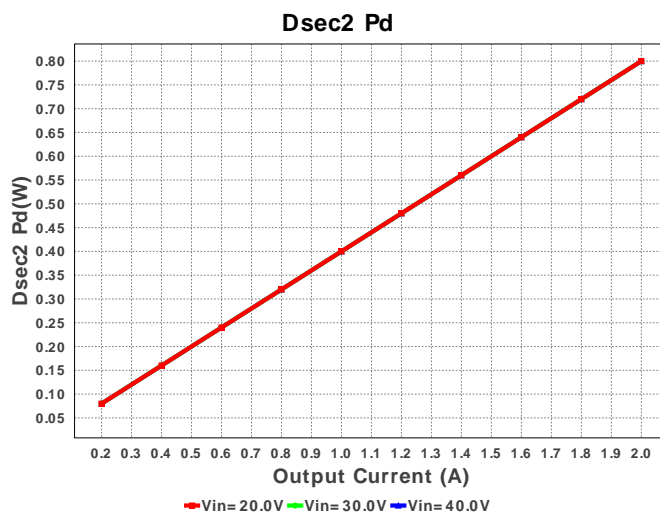
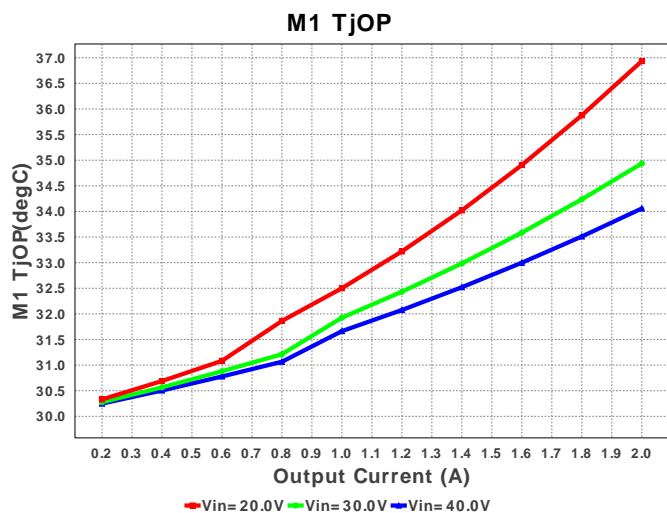
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9.	Cout2	Panasonic	20SVPG33M Series= ?	Cap= 33.0 uF ESR= 27.0 mOhm VDC= 20.0 V IRMS= 3.0 A	1	\$0.43	 CAPSMT_62_B45 53 mm ²
10.	Cref	MuRata	GRM155R61C104KA88D Series= X5R	Cap= 100.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
11.	Csc	MuRata	GRM033R60J103KA01D Series= X5R	Cap= 10.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	 0201 2 mm ²
12.	Csnub	MuRata	GRM188R71E333KA01D Series= X7R	Cap= 33.0 nF ESR= 20.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 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.	Cvdd	MuRata	GRM188R61C105KA93D Series= X5R	Cap= 1.0 uF ESR= 10.127 mOhm VDC= 16.0 V IRMS= 994.63 mA	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	Vishay-Semiconductor	SS12-E3/61T	VF@Io= 500.0 mV VRRM= 20.0 V	1	\$0.08	 SMA 37 mm ²
17.	Daux	Fairchild Semiconductor	FSV10120V	VF@Io= 800.0 mV VRRM= 120.0 V	1	\$0.21	 TO-277A 56 mm ²
18.	Dsec	Fairchild Semiconductor	FSV10120V	VF@Io= 800.0 mV VRRM= 120.0 V	1	\$0.21	 TO-277A 56 mm ²
19.	Dsec2	Fairchild Semiconductor	FSV10120V	VF@Io= 800.0 mV VRRM= 120.0 V	1	\$0.21	 TO-277A 56 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	ON Semiconductor	BZX84C7V5LT1G	Zener	1	\$0.02	 SOT-23 14 mm ²
22.	L2	Coilcraft	SER1360-102KLB	L= 1.0 uH DCR= 2.4 mOhm	1	\$0.72	 SER1360 225 mm ²
23.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	\$0.50	 TRANS_NexFET_Q3 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

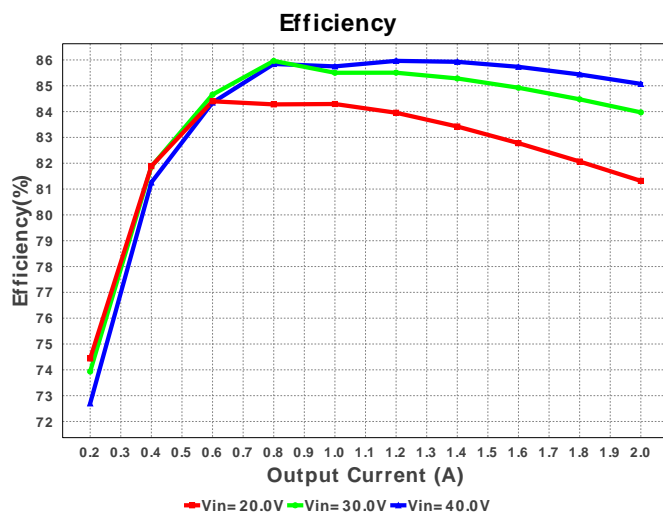
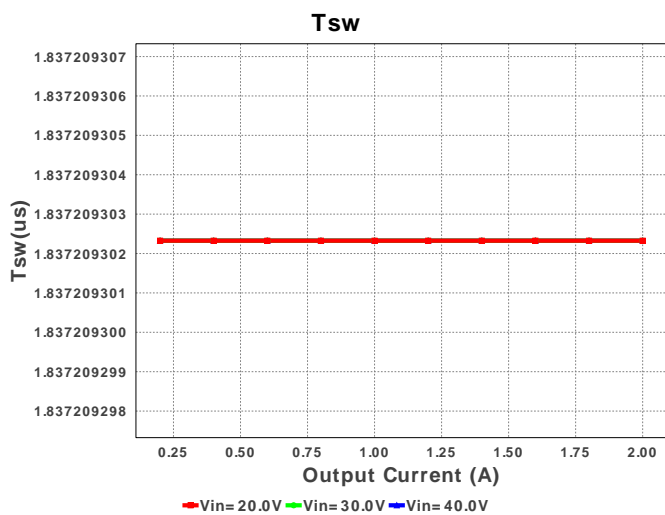
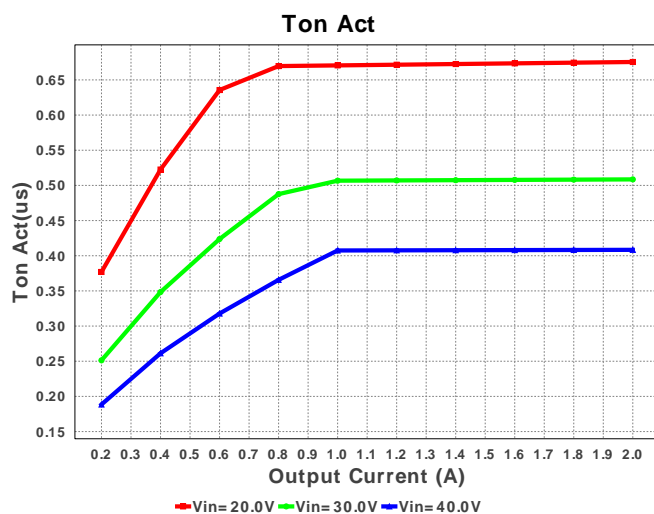
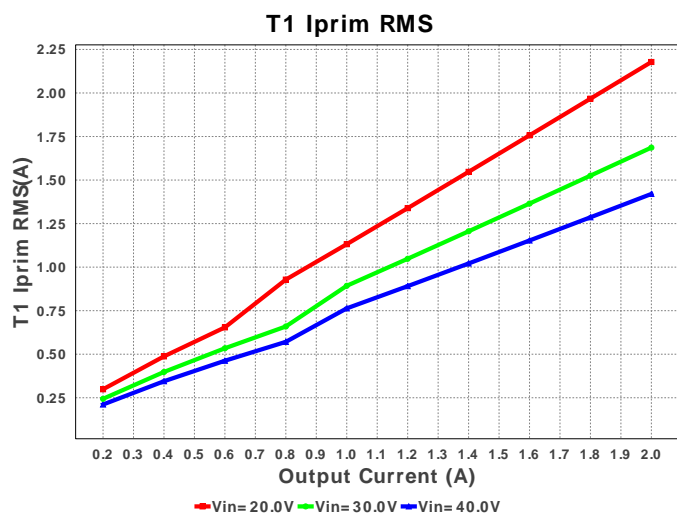
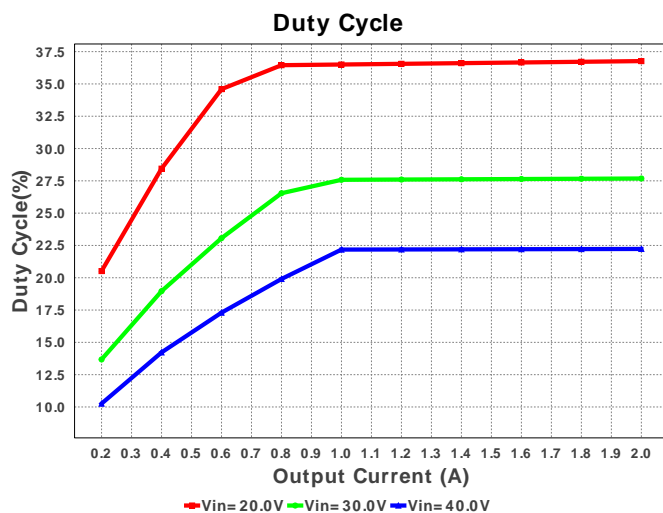
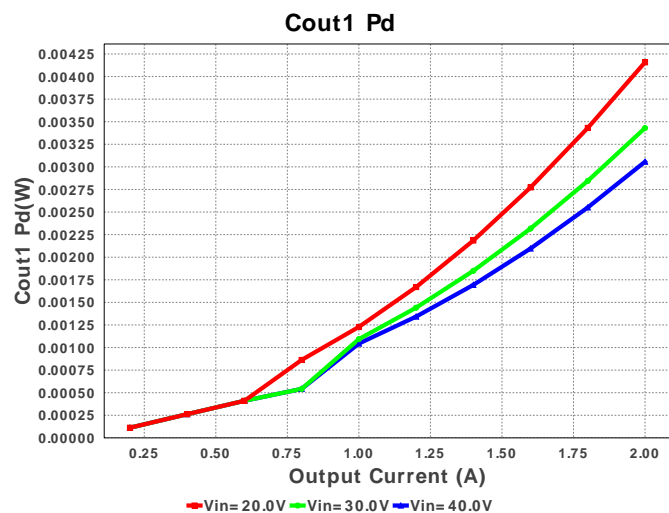
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
26.	R11	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
27.	R12	Vishay-Dale	CRCW0402267RFKED Series= CRCW..e3	Res= 267.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
28.	R13	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
29.	R21	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
30.	R22	Vishay-Dale	CRCW040254K9FKED Series= CRCW..e3	Res= 54.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
31.	Raux	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
32.	Rbias	Vishay-Dale	CRCW04023K57FKED Series= CRCW..e3	Res= 3.57 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
33.	Rcs	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
34.	Rdrv	Vishay-Dale	CRCW12065R23FKEA Series= CRCW..e3	Res= 5.23 Ohm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
35.	Rfbb	Yageo America	RT0805BRD073K79L Series= ?	Res= 3.79 kOhm Power= 125.0 mW Tolerance= 0.1%	1	\$0.05	 0805 7 mm²
36.	Rfbt	Yageo America	RT0805BRD0711K4L Series= RT0805	Res= 11.4 kOhm Power= 125.0 mW Tolerance= 0.1%	1	\$0.05	 0805 7 mm²
37.	Rled	Vishay-Dale	CRCW0402182RFKED Series= CRCW..e3	Res= 182.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
38.	Rsc	Vishay-Dale	CRCW040216K5FKED Series= CRCW..e3	Res= 16.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
39.	Rsns	CUSTOM	CUSTOM Series= ?	Res= 167.09 mOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
40.	Rsnub	CUSTOM	CUSTOM Series= ?	Res= 1.08841 kOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
41.	Rstartup1	Panasonic	ERJ-8ENF1822V Series= ERJ-8E	Res= 18.2 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
42.	Rstartup2	Panasonic	ERJ-8ENF1822V Series= ERJ-8E	Res= 18.2 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
43.	Rt	Vishay-Dale	CRCW04021K58FKED Series= CRCW..e3	Res= 1.58 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
44.	Rz	Vishay-Dale	CRCW04021K10FKED Series= CRCW..e3	Res= 1.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²

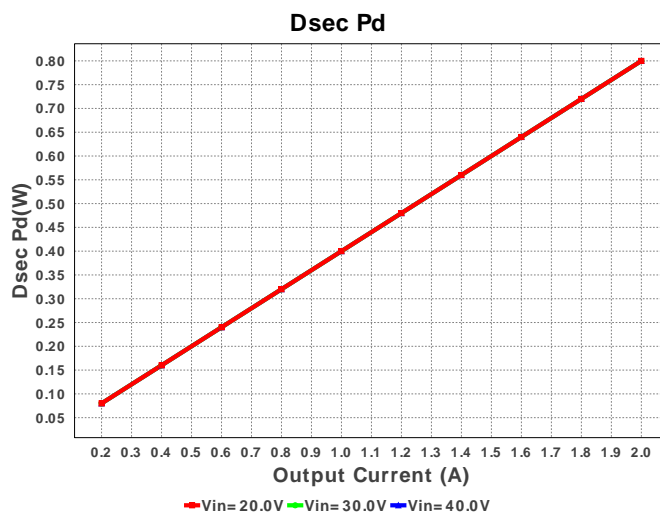
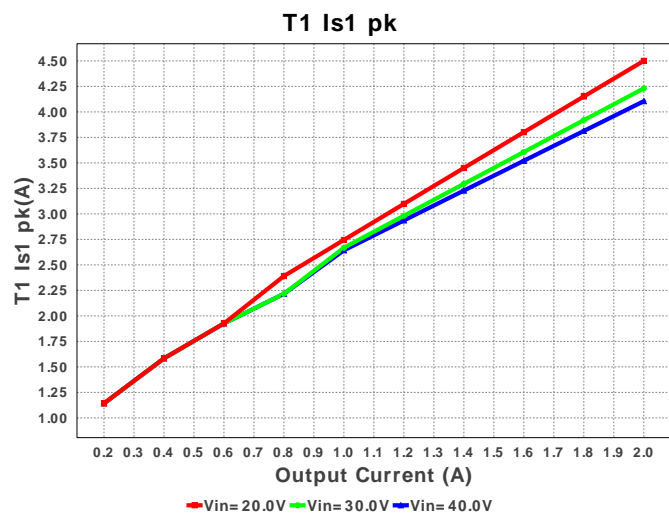
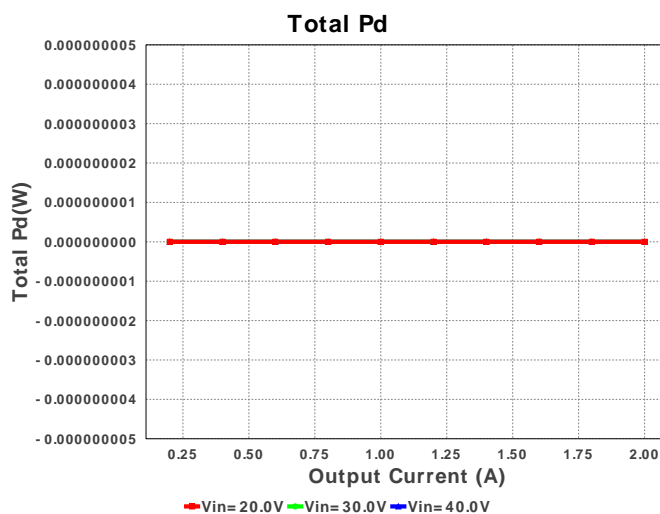
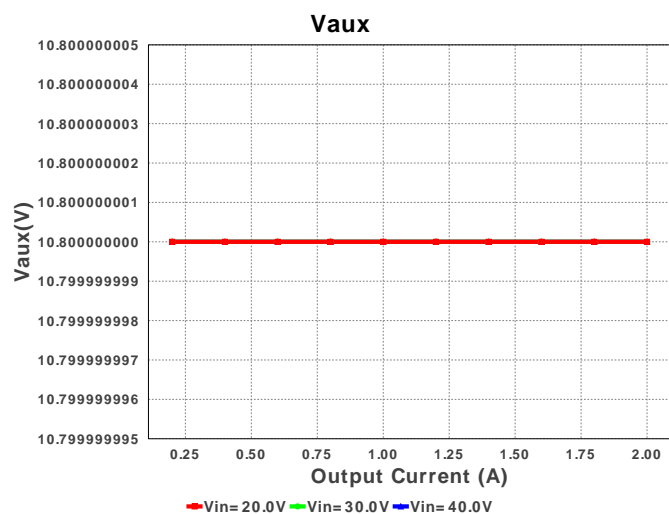
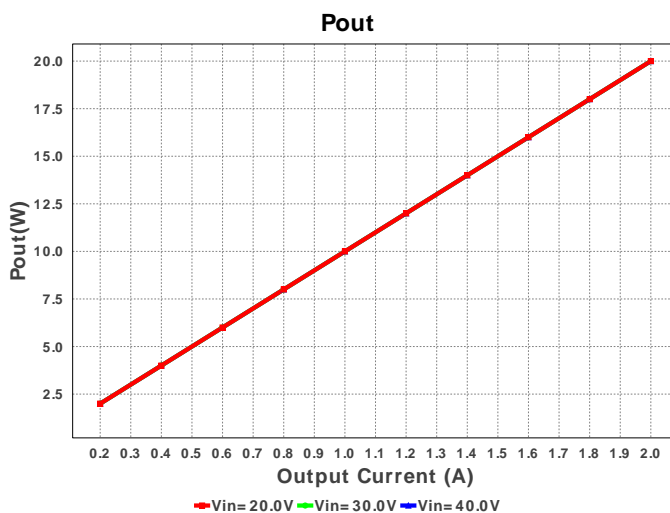
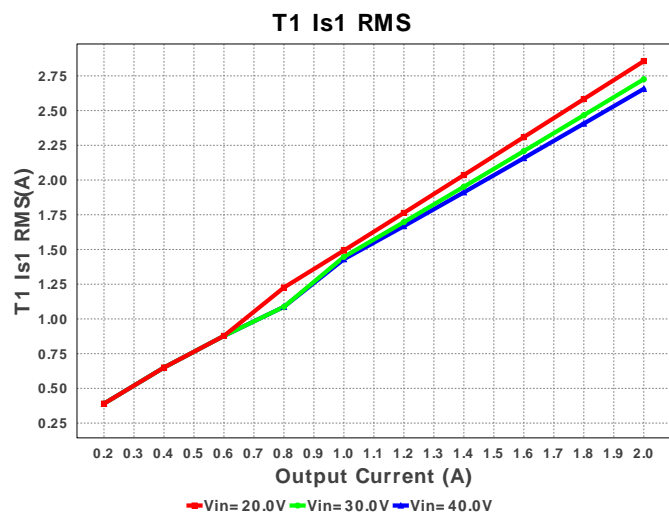
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
45.	T1	Würth Elektronik	749196241	Lp= 6.6 μ H Rp= 159.0 mOhm Leakage_L= 170.0 nH Ns1toNp= 1.0 Rs1= 159.0 mOhms Ns2toNp= 1.0 Rs2= 159.0 mOhms	1	NA	 ER14.5-6 344 mm ²
46.	U1	Texas Instruments	UCC38C41DR	Switcher	1	\$0.70	 D0008A 57 mm ²
47.	VR	Texas Instruments	TL431AIDBZR	Voltage References	1	\$0.08	 DBZ0003A 14 mm ²

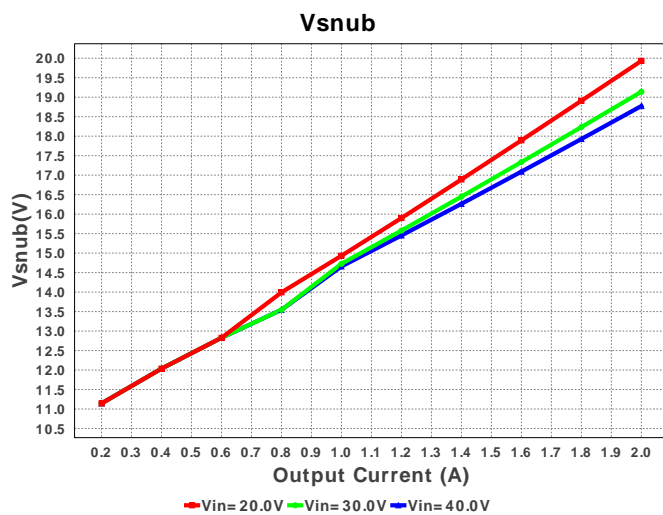
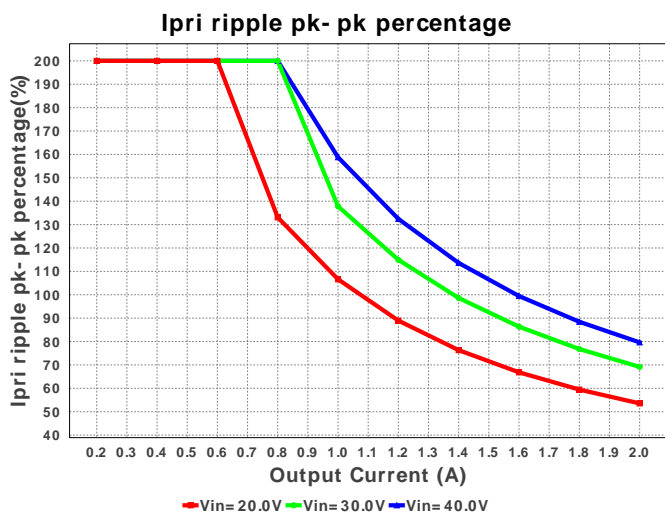
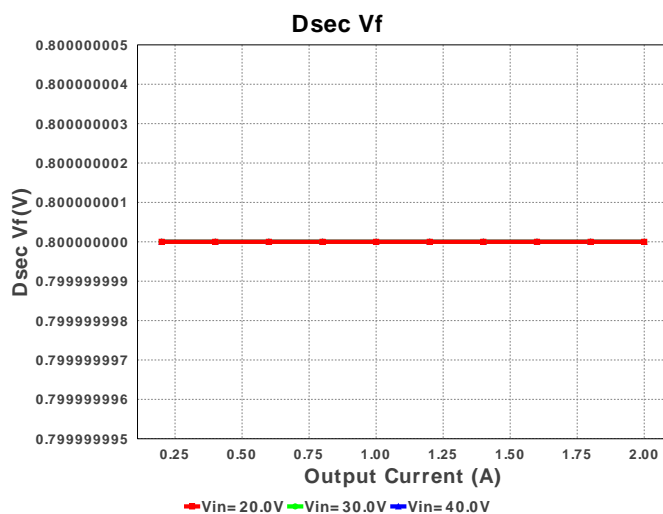
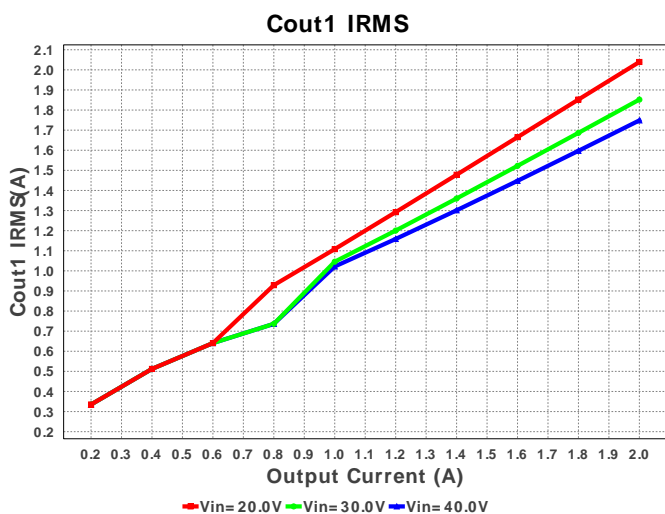
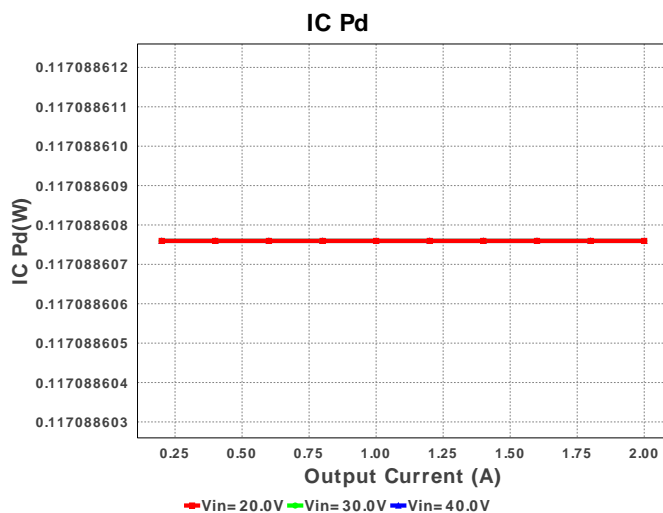
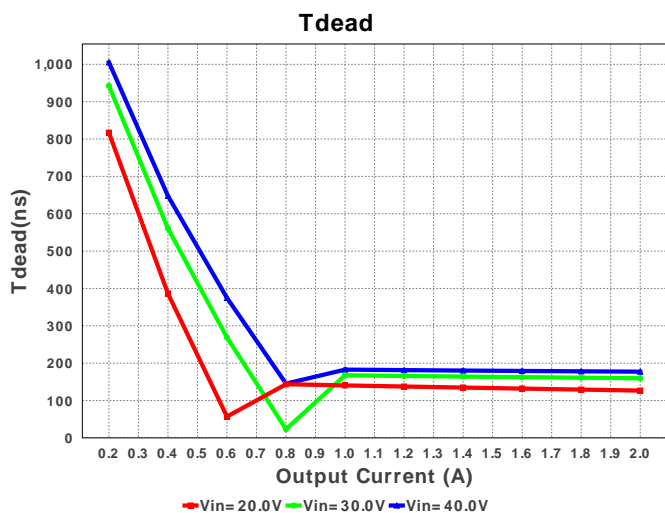


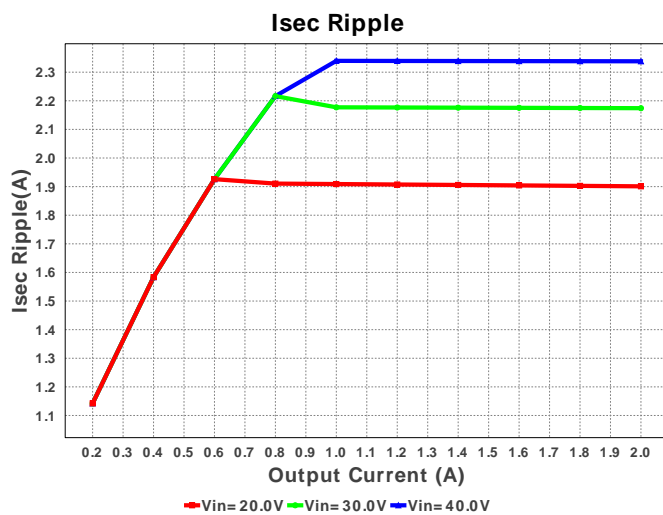
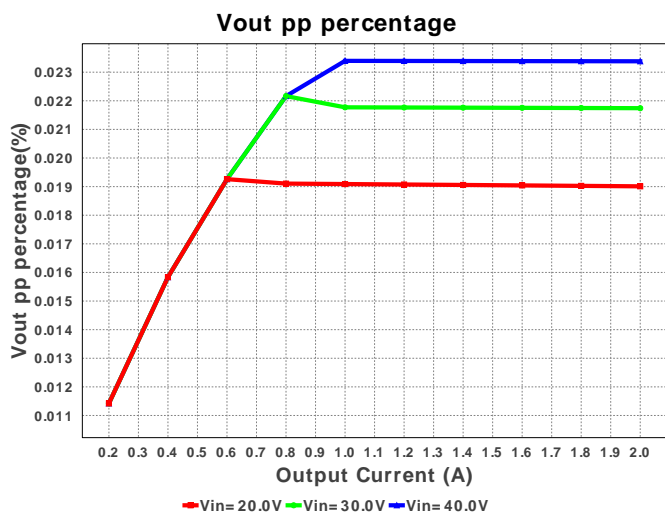
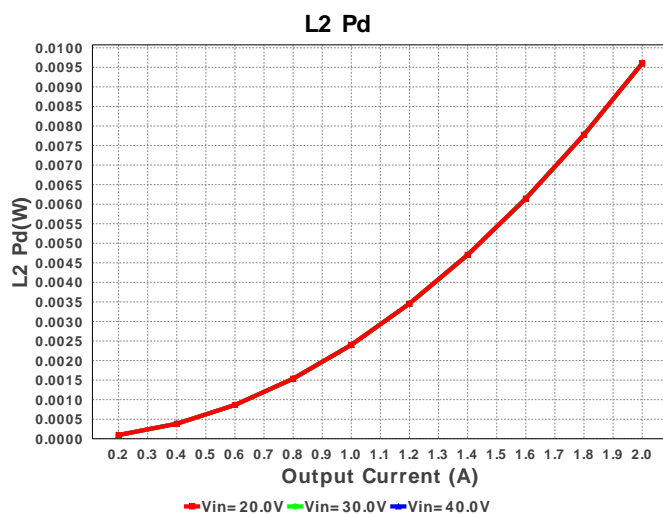
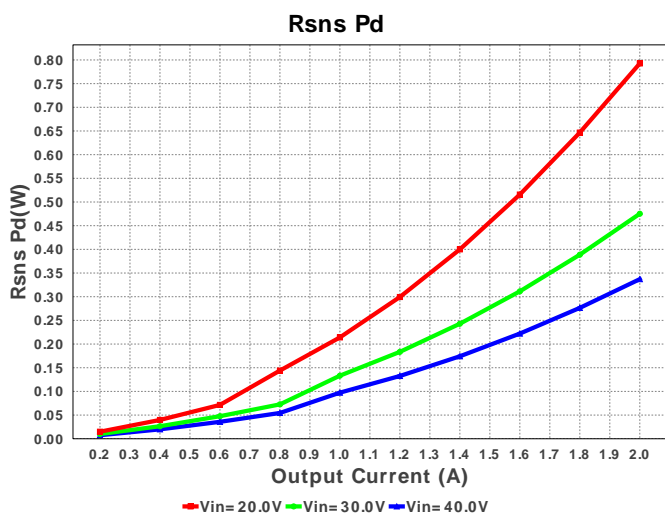
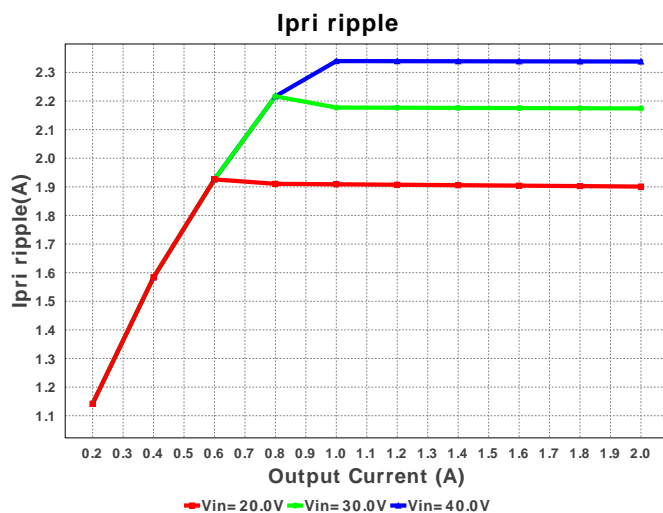
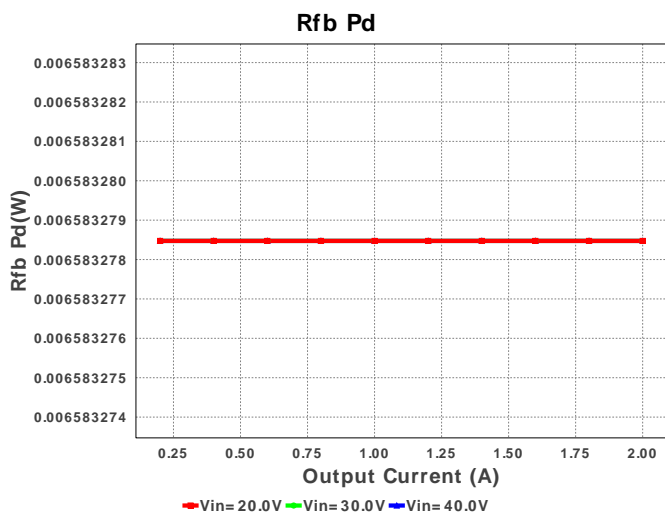


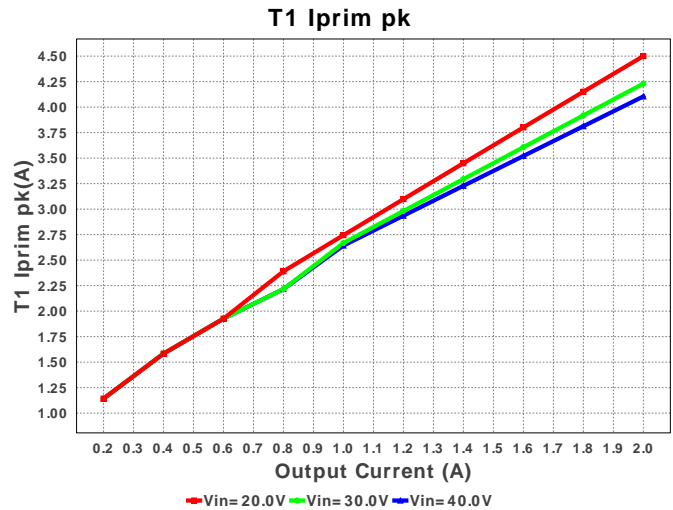
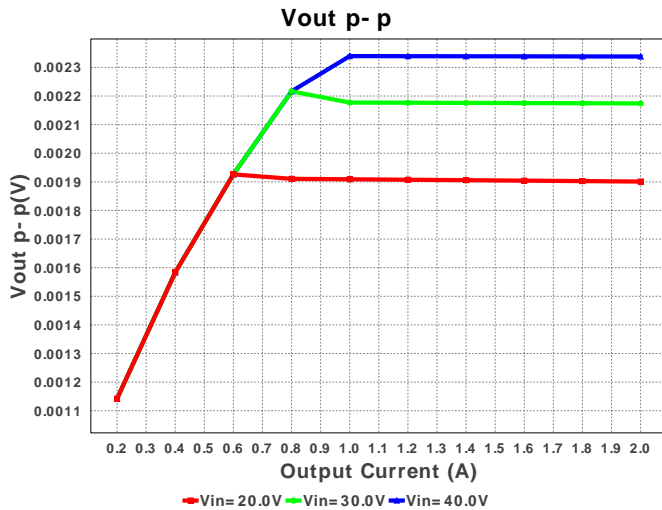












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	2.039 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	1.23 A	Current	Average input current
3.	Iout_DCM	679.206 mA	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	1.305 A	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	1.901 A	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	53.553 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	1.901 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	2.178 A	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	4.5 A	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	2.856 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	4.5 A	Current	Transformer Secondary1 Peak Current
12.	BOM Count	48	General	Total Design BOM count
13.	Daux trr	16.7 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	0.0 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	1.383 k mm ²	General	Total Foot Print Area of BOM components
19.	Frequency	544.304 kHz	General	Switching frequency
20.	Pout	20.0 W	General	Total output power
21.	Tdead	126.605 ns	General	Approximate Dead Time of the Regulator
22.	Toff	1.035 us	General	Approximate Converter Off Time
23.	Ton Act	675.481 mus	General	Approximate Converter On Time
24.	Total BOM	\$0.0	General	Total BOM Cost
25.	Tsw	1.837 us	General	Switching Time Period
26.	Vaux	10.8 V	General	Auxiliary Voltage
27.	Vsnub	19.932 V	General	Voltage Across the Snubber
28.	Vout Actual	10.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
29.	Vout OP	10.0 V	Op_Point	Operational Output Voltage
30.	Duty Cycle	36.767 %	Op_point	Duty cycle
31.	Efficiency	81.317 %	Op_point	Steady state efficiency
32.	IC Tj	35.854 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	36.935 degC	Op_point	M1 MOSFET junction temperature
36.	Vout p-p	1.901 mV	Op_point	Peak-to-peak output ripple voltage
37.	Cin Pd	9.078 mW	Power	Input capacitor power dissipation
38.	Cout1 Pd	4.158 mW	Power	Output capacitor1 power dissipation
39.	Dsec Pd	800.0 mW	Power	Secondary Diode Power Dissipation
40.	Dsec2 Pd	800.0 mW	Power	Secondary Diode Power Dissipation
41.	IC Pd	117.089 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	126.084 mW	Power	M1 MOSFET total power dissipation
44.	Paux	17.226 mW	Power	Power Dissipation in Raux and Daux
45.	Pd Rstartup	7.754 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
46.	Rdrv Pd	396.665 μW	Power	Power Dissipation in Gate Drive Resistor
47.	Rfb Pd	6.583 mW	Power	Rfb Power Dissipation
48.	Rsns Pd	792.626 mW	Power	Current Limit Sense Resistor Power Dissipation
49.	Snubber Pd	373.347 mW	Power	Snubber Power Dissipation
50.	T1 Pd	4.103 W	Power	Estimated Losses in Transformer

#	Name	Value	Category	Description
51.	Total Pd	0.0 W	Power	Total Power Dissipation
52.	Vout Tolerance	471.37 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
53.	Vout pp percentage	19.01 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	40.0	Maximum input voltage
3.	VinMin	20.0	Minimum input voltage
4.	Vout	10.0	Output Voltage
5.	base_pn	UCC38C41	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. UCC38C41 Product Folder : <http://www.ti.com/product/UCC38C41> : contains the data sheet and other resources.

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