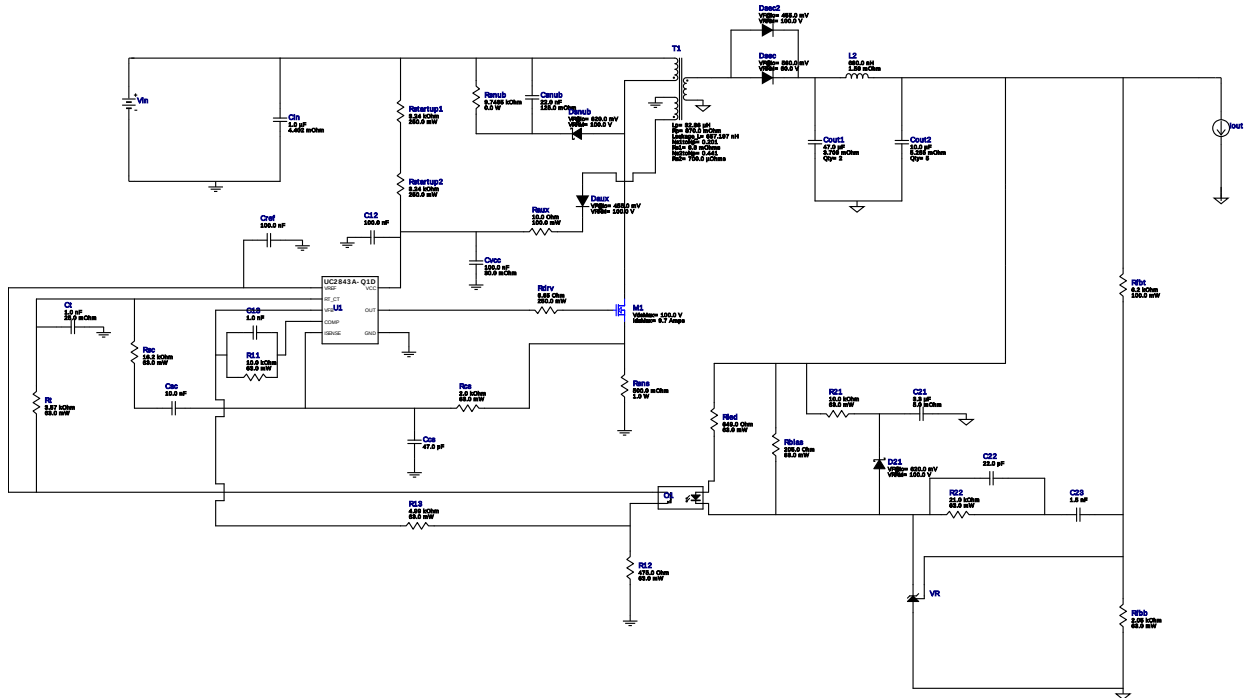


WEBENCH® Design Report

Design : 3893481/2 UC2843AQD8RQ1
UC2843AQD8RQ1 20.0V-30.0V to 5.00V @ 2.0A



My Comments

2

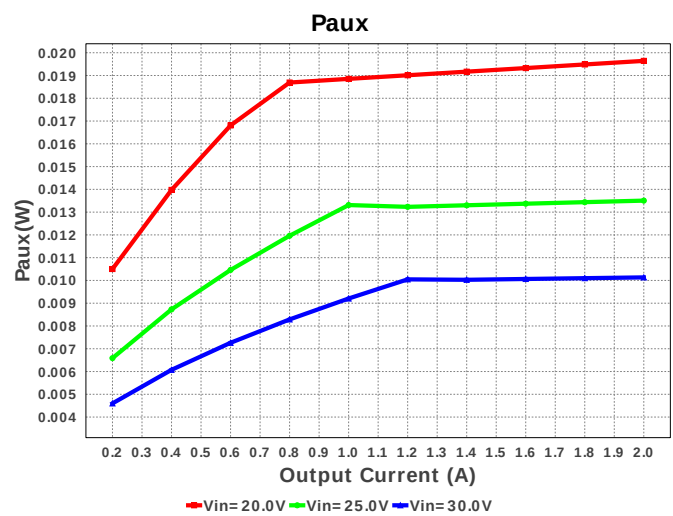
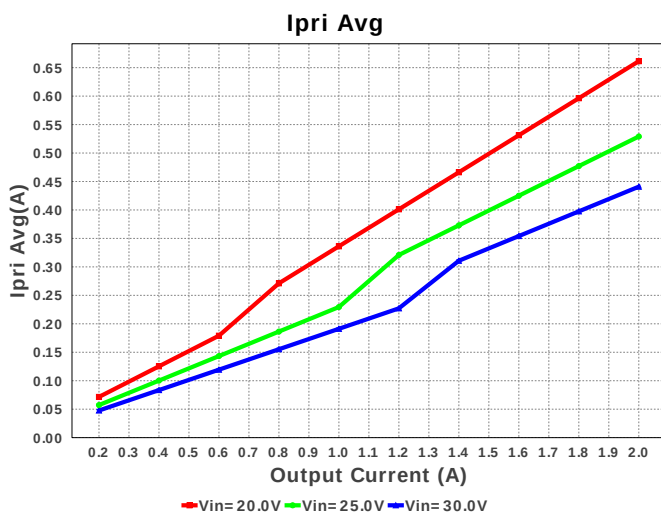
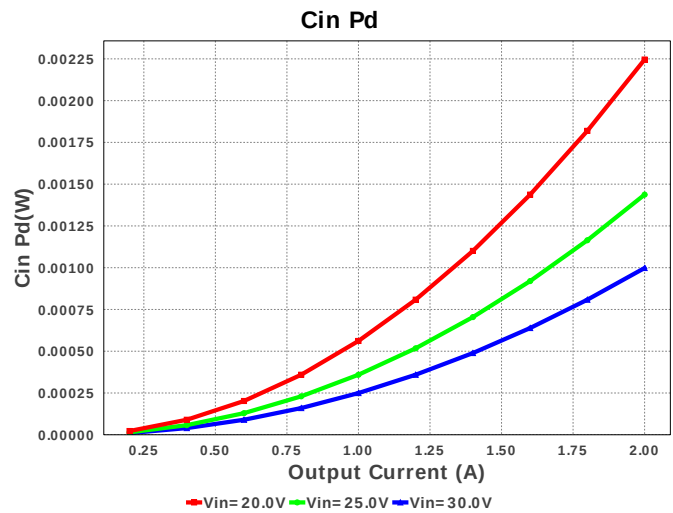
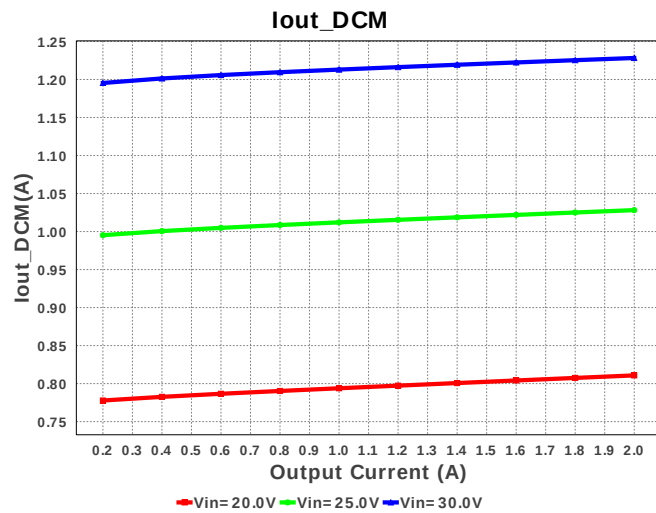
Electrical BOM

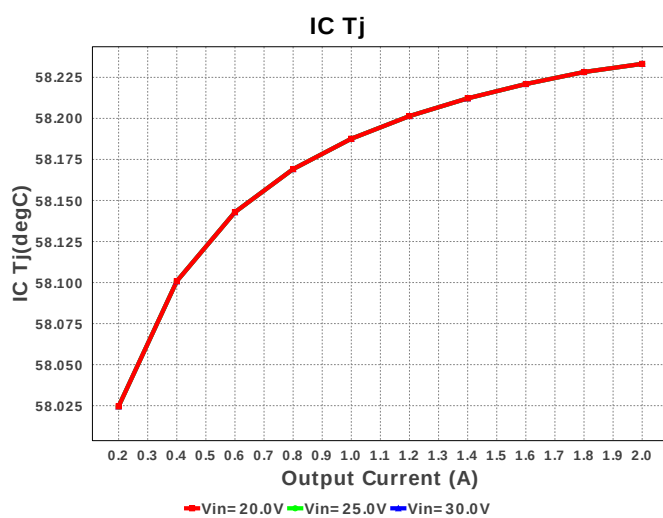
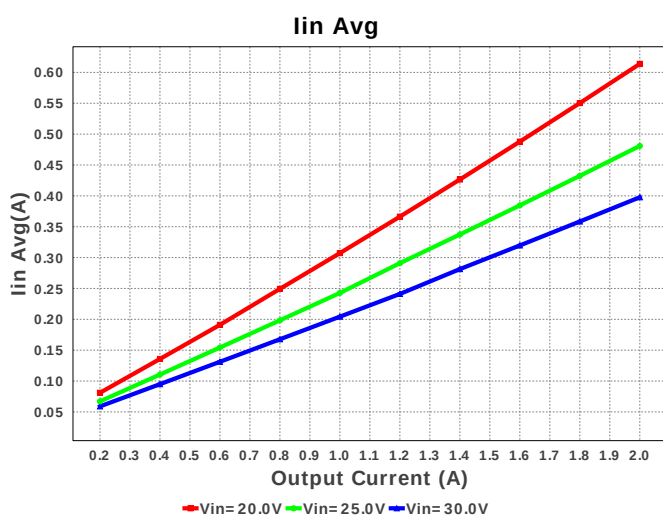
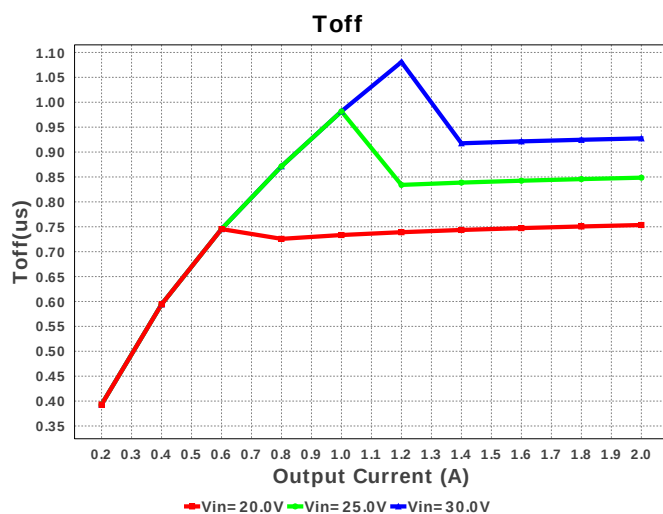
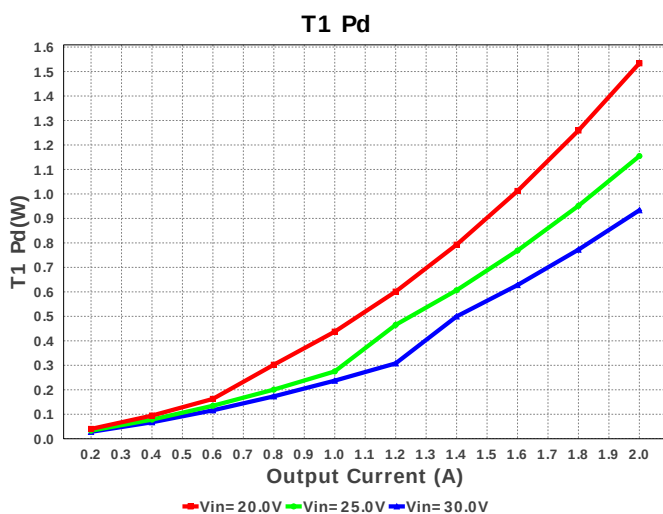
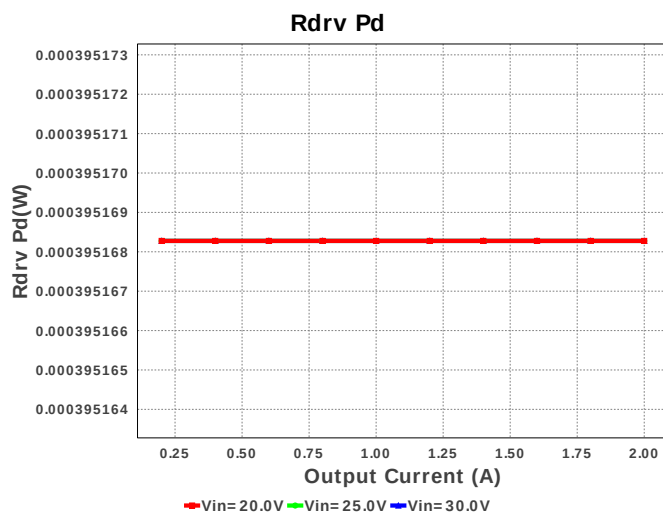
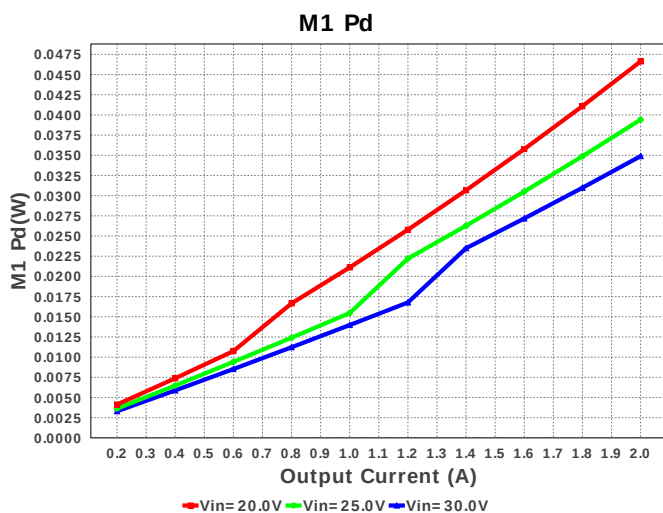
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1.	C12	MuRata	GRM155R61C104KA88D Series= X5R	Cap= 100.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	C13	MuRata	GRM033R71C102KA01D Series= X7R	Cap= 1.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
3.	C21	MuRata	GRM188R61A335KE15D Series= X5R	Cap= 3.3 uF ESR= 5.0 mOhm VDC= 10.0 V IRMS= 1.7 A	1	\$0.04	0603 5 mm ²
4.	C22	MuRata	GRM0225C1C220JD05L Series= C0G/NP0	Cap= 22.0 pF VDC= 16.0 V IRMS= 0.0 A	1	\$0.03	01005 2 mm ²
5.	C23	MuRata	GRM033R61A152KA01D Series= X5R	Cap= 1.5 nF VDC= 10.0 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	GRM21BR71H105KA12L Series= X7R	Cap= 1.0 uF ESR= 4.402 mOhm VDC= 50.0 V IRMS= 1.677 A	1	\$0.05	0805 7 mm ²

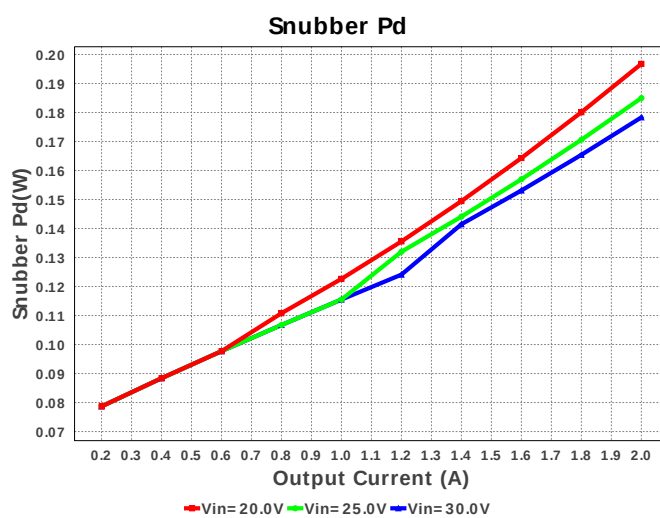
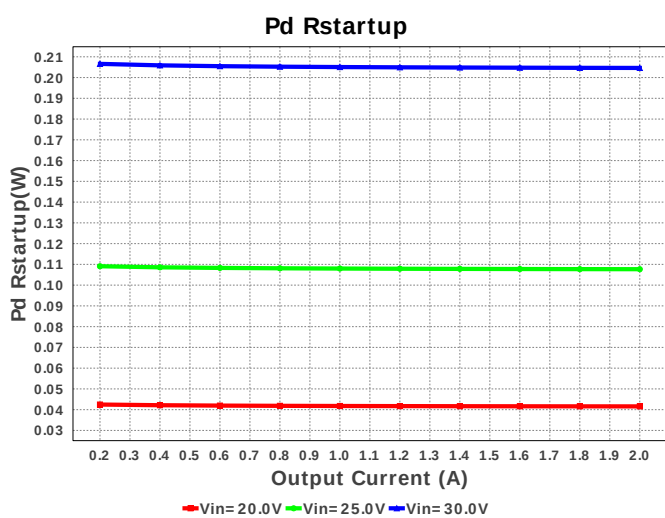
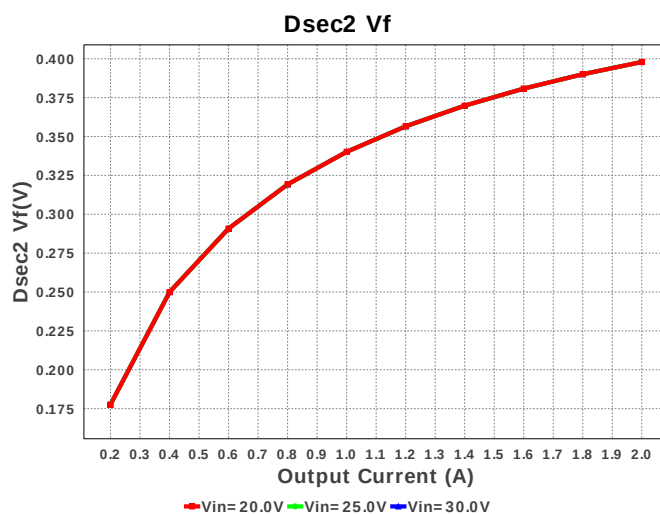
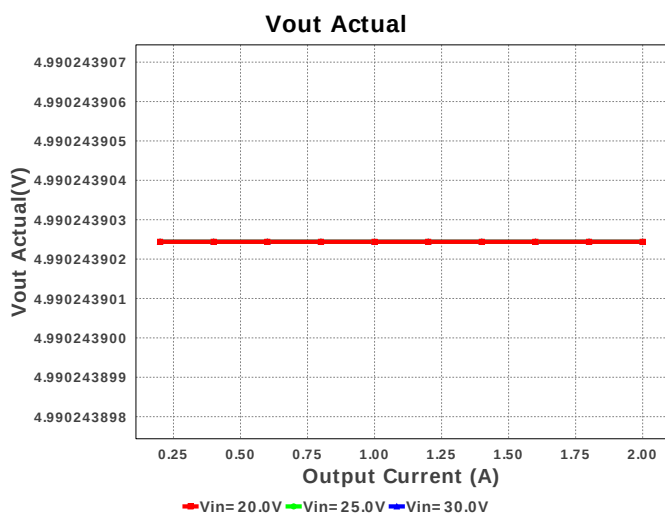
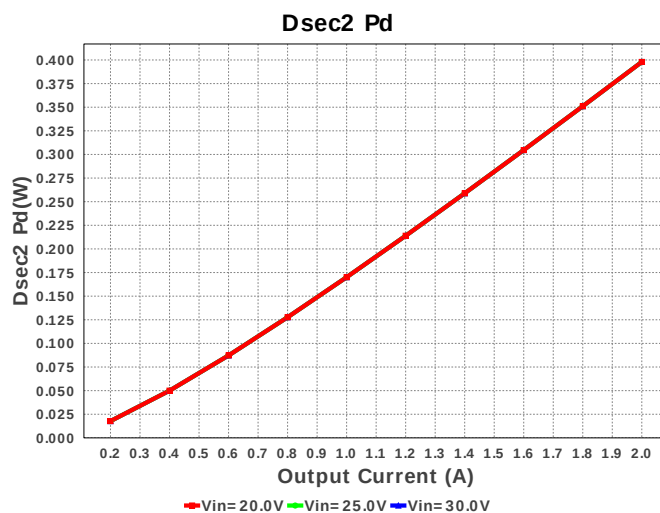
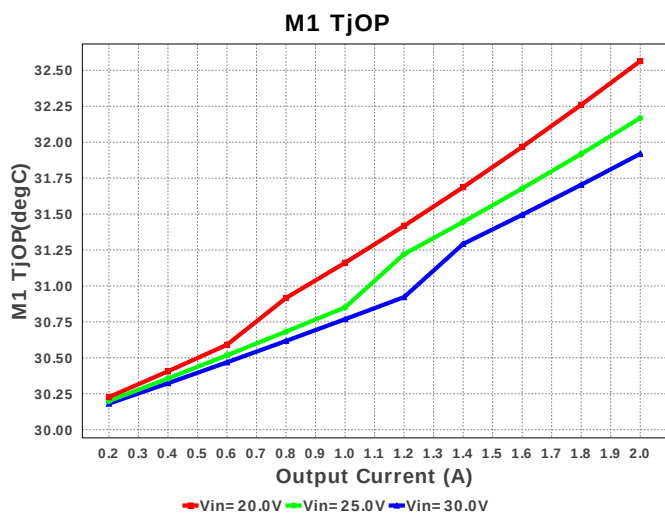
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8.	Cout1	MuRata	GRM31CR61A476KE15L Series= X5R	Cap= 47.0 uF ESR= 3.709 mOhm VDC= 10.0 V IRMS= 4.2862 A	2	\$0.15	 1206_190 11 mm ²
9.	Cout2	MuRata	GRM31MR61A106KE19L Series= X5R	Cap= 10.0 uF ESR= 5.285 mOhm VDC= 10.0 V IRMS= 2.4531 A	5	\$0.06	 1206 11 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	Kemet	C0805C223K5RACTU Series= X7R	Cap= 22.0 nF ESR= 125.0 mOhm VDC= 50.0 V IRMS= 645.0 mA	1	\$0.01	 0805 7 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	Vishay-Semiconductor	SS2PH10-M3	VF@Io= 620.0 mV VRRM= 100.0 V	1	\$0.14	 DO-220AA 14 mm ²
16.	Daux	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm ²
17.	Dsec	Diodes Inc.	PDS760-13	VF@Io= 560.0 mV VRRM= 60.0 V	1	\$0.60	 PowerDI5 50 mm ²
18.	Dsec2	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm ²
19.	Dsnub	Vishay-Semiconductor	SS2PH10-M3	VF@Io= 620.0 mV VRRM= 100.0 V	1	\$0.14	 DO-220AA 14 mm ²
20.	L2	Würth Elektronik	744313068	L= 680.0 nH DCR= 1.58 mOhm	1	\$3.21	 WE-HC5 80 mm ²
21.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 9.7 Amps	1	\$0.75	 TRANS_NexFET_Q3 18 mm ²
22.	O1	Vishay-Semiconductor	TCMT1109	Optocoupler	1	\$0.21	 SOP-4 44 mm ²
23.	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
24.	R12	Vishay-Dale	CRCW0402475RFKED Series= CRCW..e3	Res= 475.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

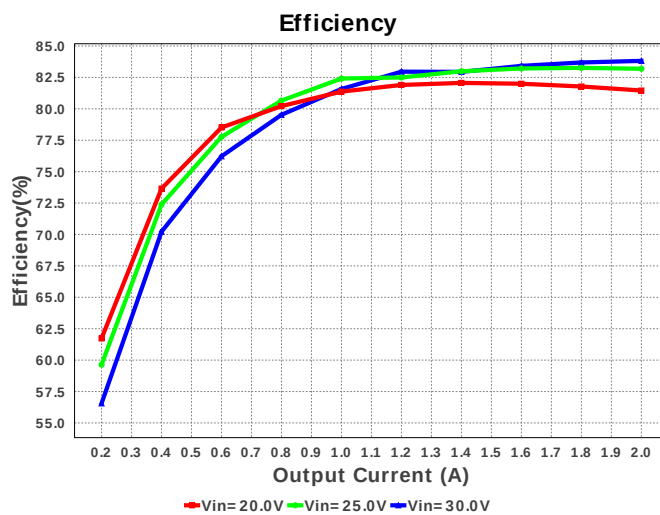
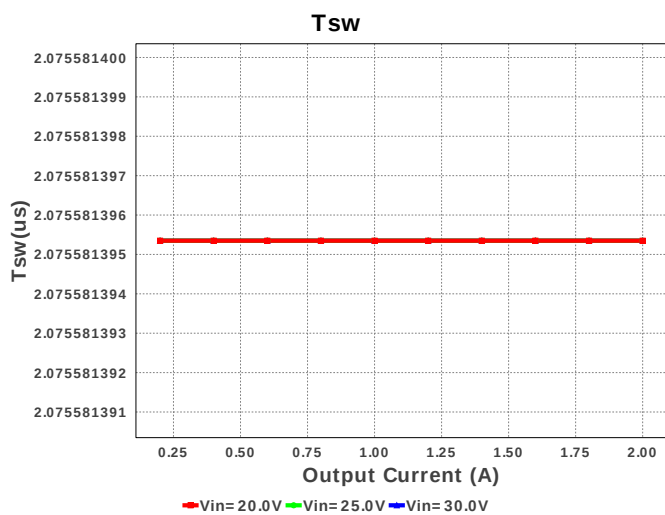
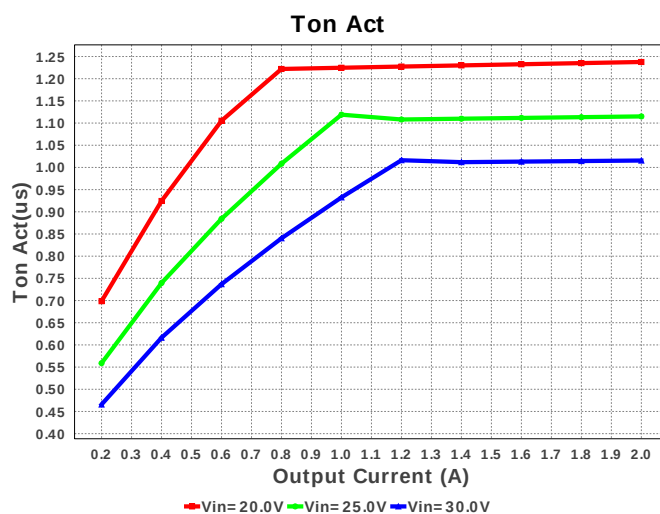
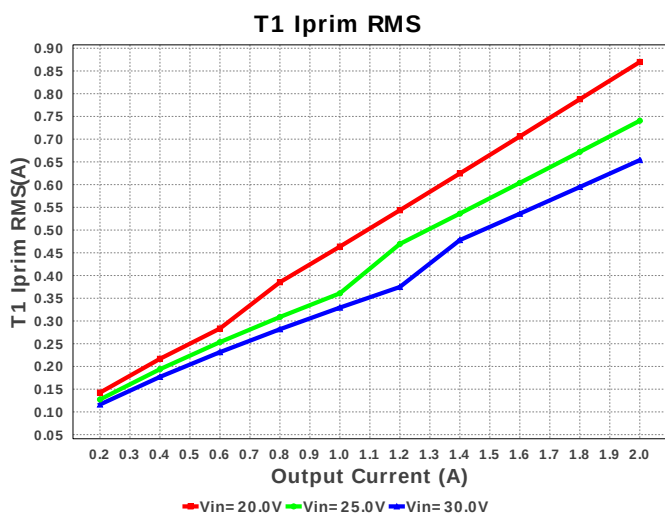
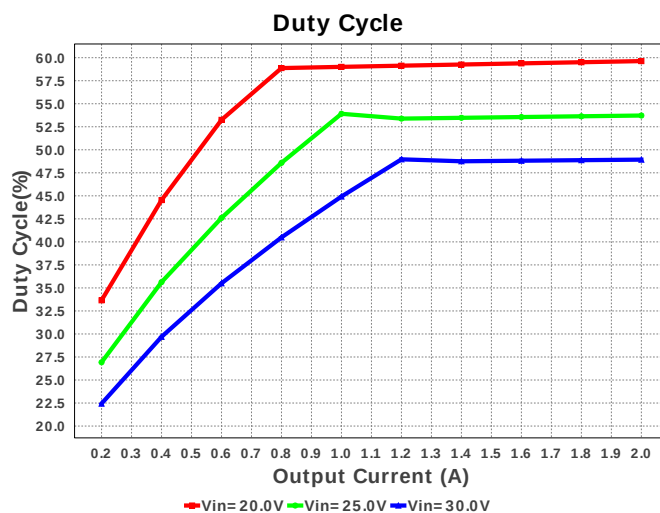
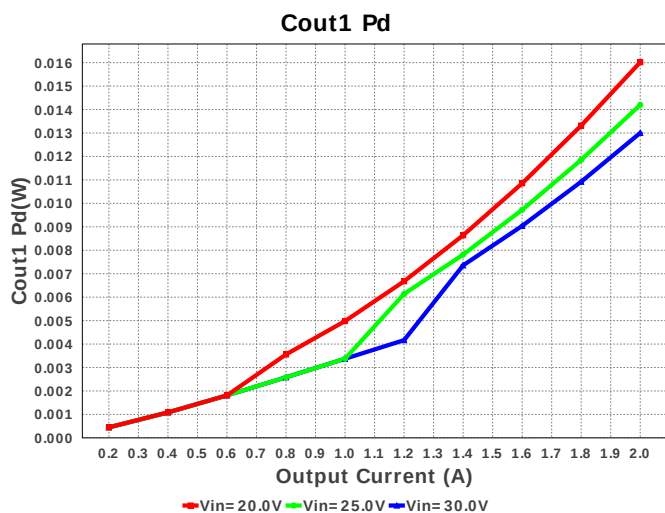
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
25.	R13	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
26.	R21	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
27.	R22	Vishay-Dale	CRCW040221K0FKED Series= CRCW..e3	Res= 21.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
28.	Raux	Vishay-Dale	CRCW060310R0FKEA Series= CRCW..e3	Res= 10.0 Ohm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm²
29.	Rbias	Vishay-Dale	CRCW0402205RFKED Series= CRCW..e3	Res= 205.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
30.	Rcs	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
31.	Rdrv	Vishay-Dale	CRCW12066R65FKEA Series= CRCW..e3	Res= 6.65 Ohm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
32.	Rfbb	Vishay-Dale	CRCW04022K05FKED Series= CRCW..e3	Res= 2.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
33.	Rfbt	Yageo America	RC0603FR-076K2L Series= ?	Res= 6.2 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm²
34.	Rled	Vishay-Dale	CRCW0402649RFKED Series= CRCW..e3	Res= 649.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
35.	Rsc	Vishay-Dale	CRCW040216K2FKED Series= CRCW..e3	Res= 16.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
36.	Rsns	Stackpole Electronics Inc	CSRN2010FKR500 Series= ?	Res= 500.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	\$0.10	 2010 32 mm²
37.	Rsnu	CUSTOM	CUSTOM Series= ?	Res= 9.7465 kOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
38.	Rstartup1	Panasonic	ERJ-8ENF3241V Series= ERJ-8E	Res= 3.24 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
39.	Rstartup2	Panasonic	ERJ-8ENF3241V Series= ERJ-8E	Res= 3.24 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm²
40.	Rt	Vishay-Dale	CRCW04023K57FKED Series= CRCW..e3	Res= 3.57 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
41.	T1	CUSTOM	CUSTOM	Lp= 32.86 µH Rp= 870.0 mOhm Leakage_L= 657.197 nH Ns1toNp= 0.201 Rs1= 8.6 mOhms Ns2toNp= 0.441 Rs2= 700.0 µOhms	1	NA	CUSTOM 0 mm²
42.	U1	Texas Instruments	UC2843AQD8RQ1	Switcher	1	\$0.49	 D0008A 57 mm²

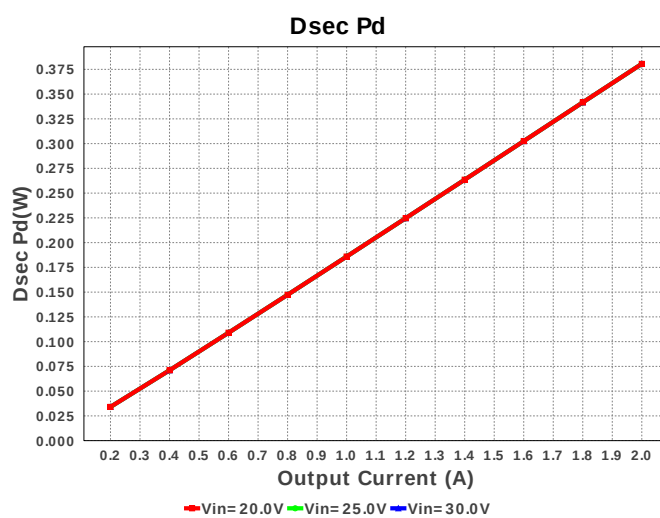
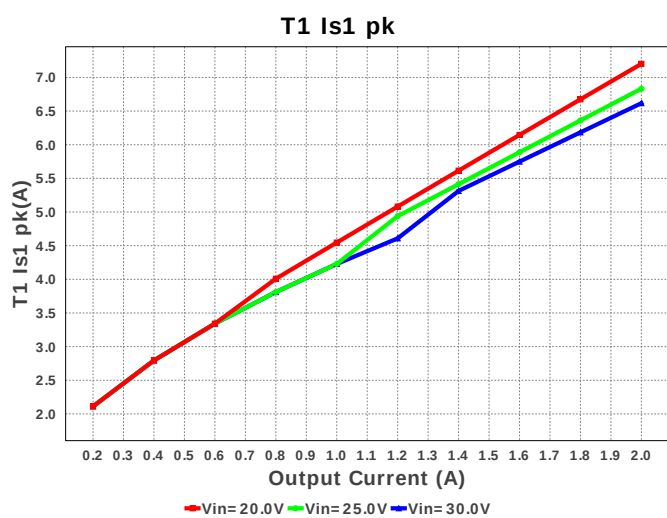
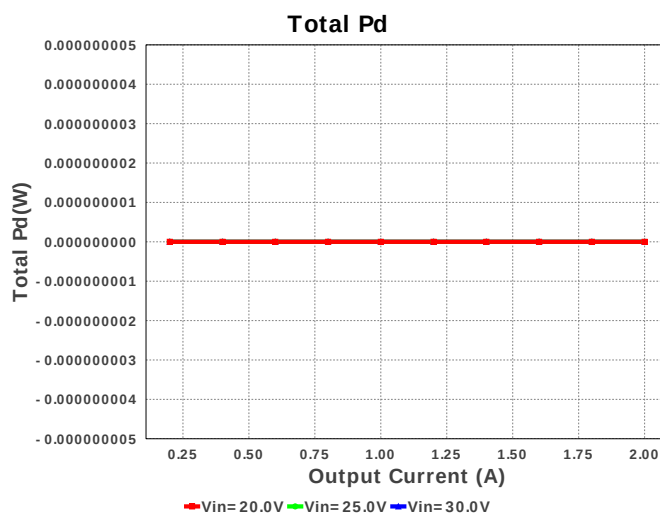
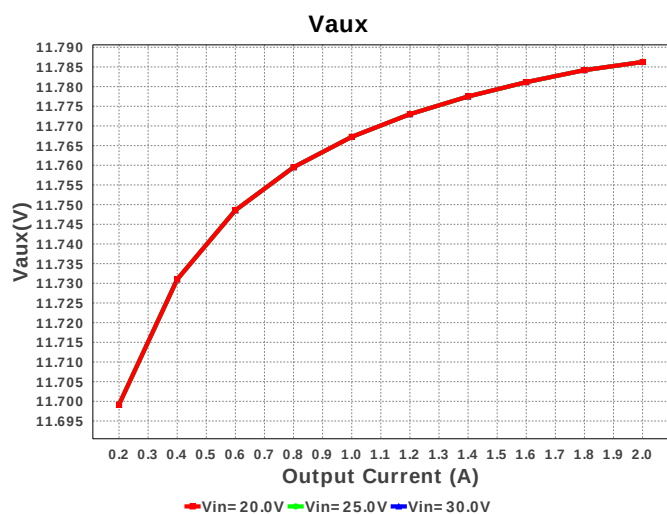
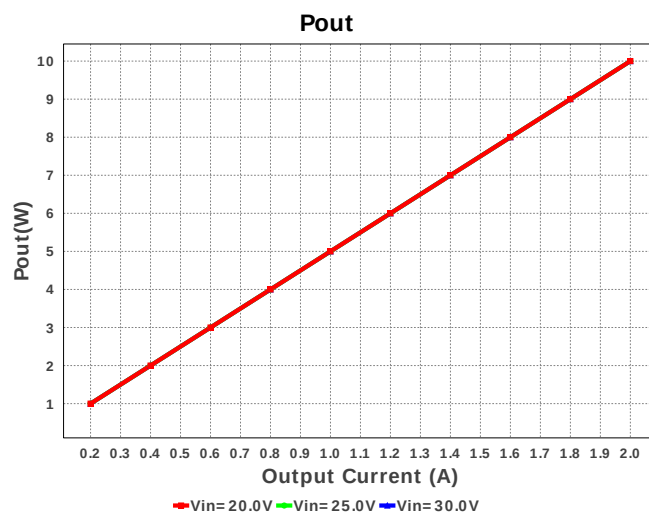
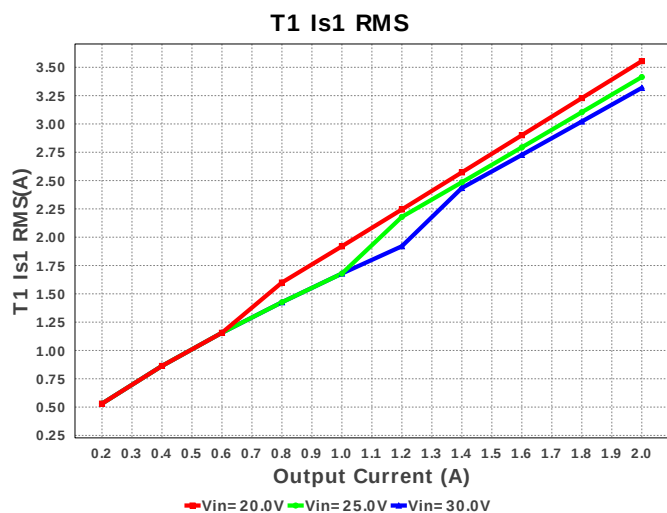
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
43.	VR	Texas Instruments	LMV431CM5/NOPB	Voltage References	1	\$0.16	 R-PDSO-G3 16 mm²

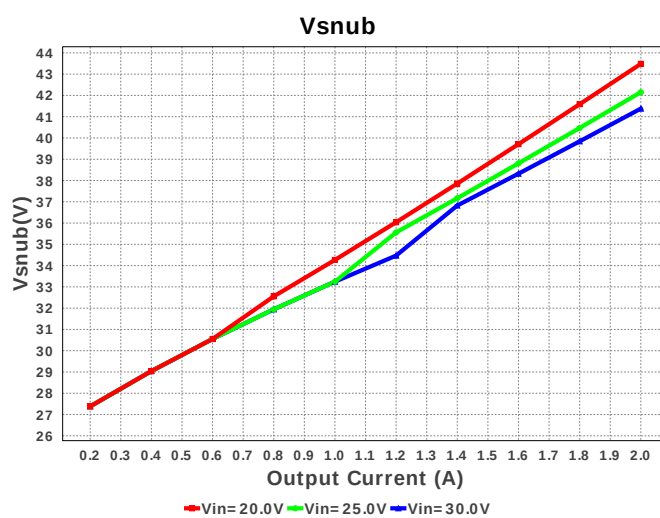
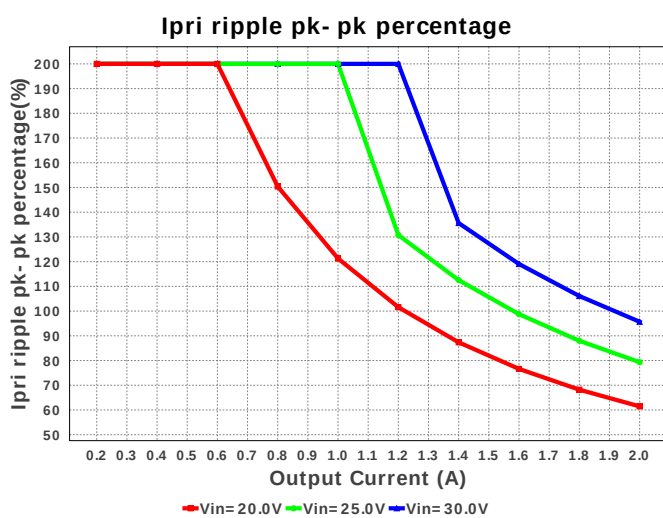
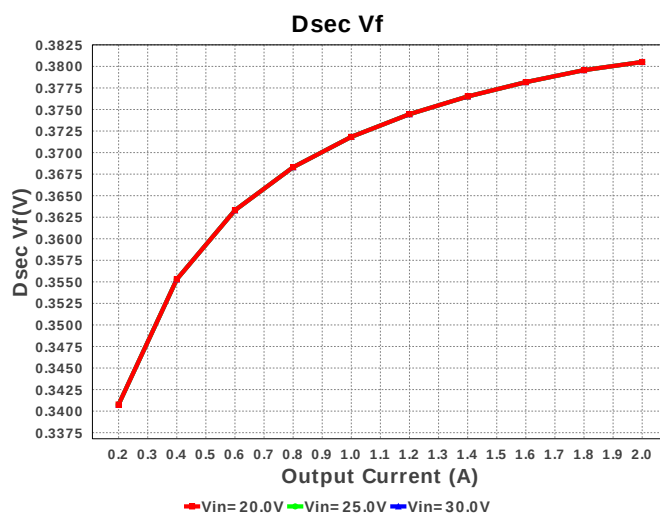
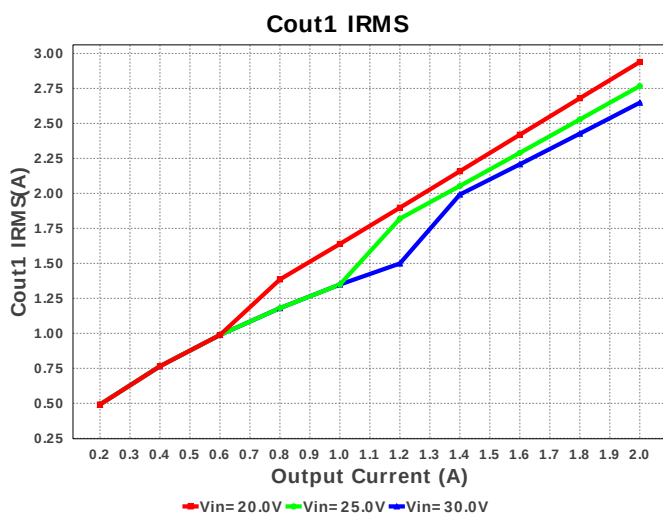
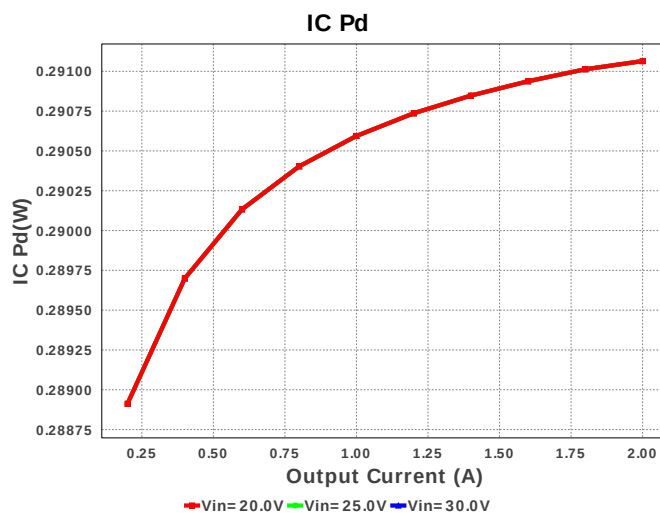
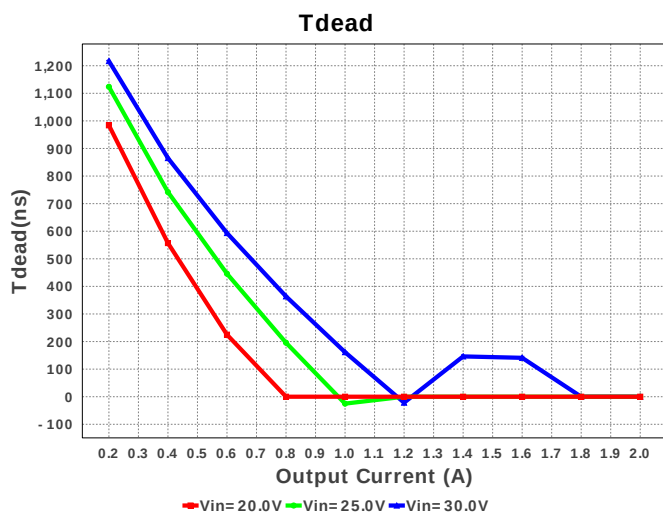


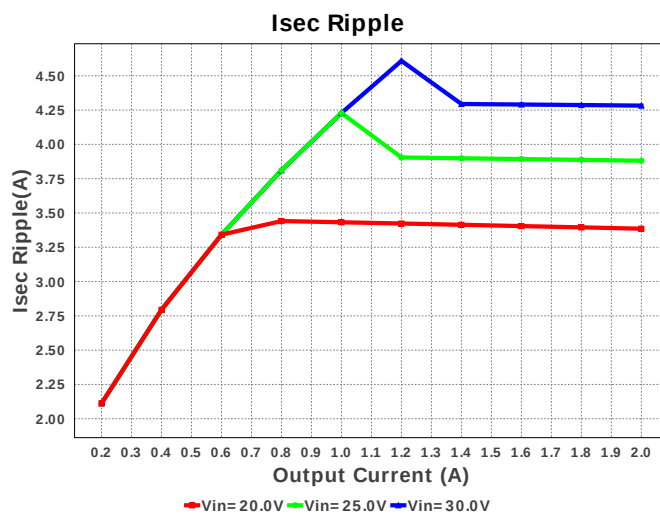
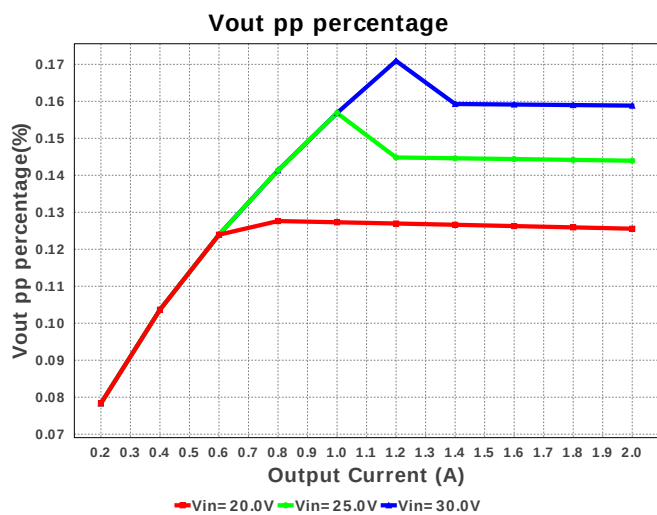
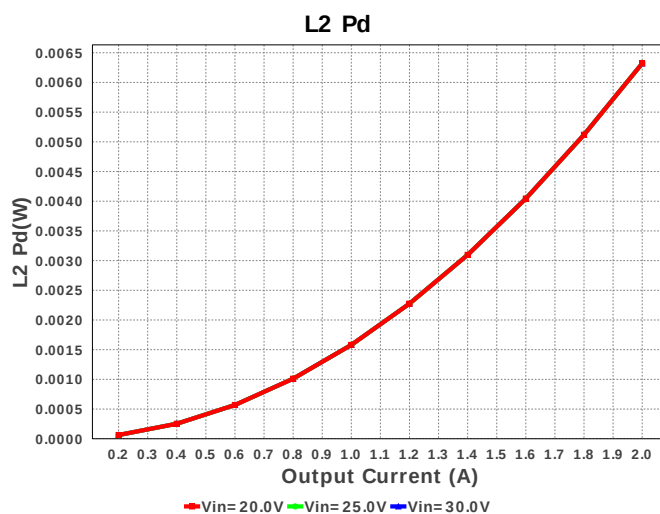
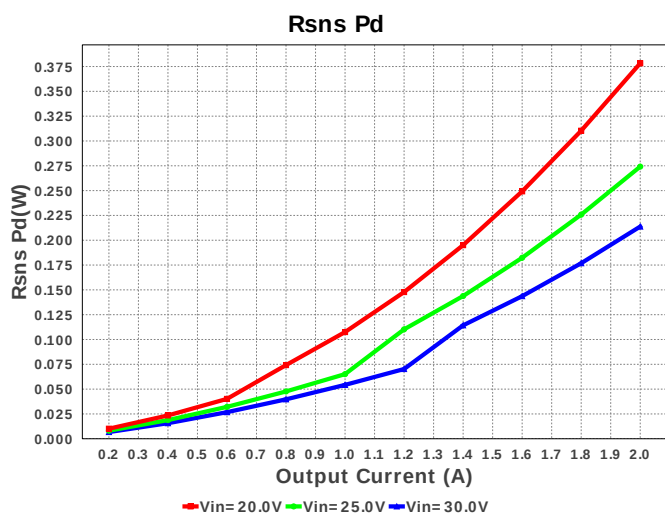
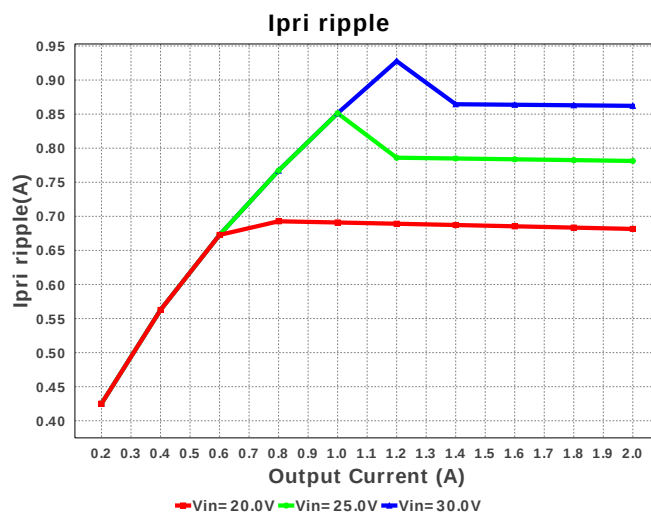
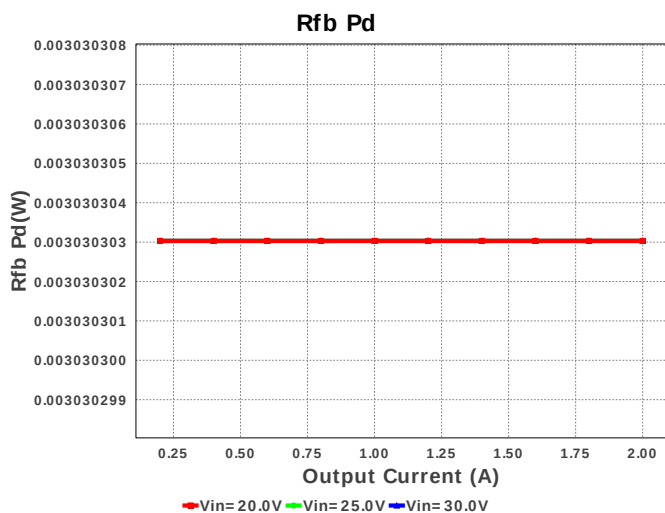


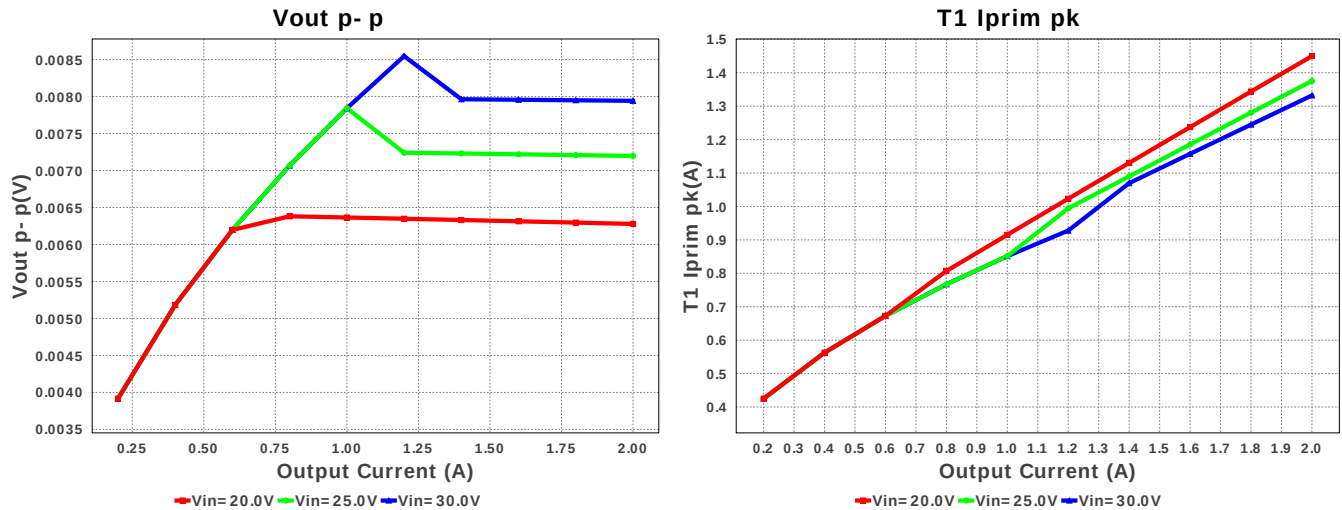












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	2.939 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	613.82 mA	Current	Average input current
3.	Iout_DCM	810.795 mA	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	661.321 mA	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	681.511 mA	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	61.451 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	3.385 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	869.776 mA	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	1.45 A	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	3.555 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	7.202 A	Current	Transformer Secondary1 Peak Current
12.	BOM Count	48	General	Total Design BOM count
13.	Daux trr	0.0 ns	General	Auxiliary Diode Reverse Recovery Time
14.	Dsec Vf	380.514 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	397.923 mV	General	Effective Forward Voltage Drop at the Operating Current
17.	Dsnub trr	0.0 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	951.0 mm ²	General	Total Foot Print Area of BOM components
19.	Frequency	481.793 kHz	General	Switching frequency
20.	Pout	10.0 W	General	Total output power
21.	Tdead	0.0 ns	General	Approximate Dead Time of the Regulator
22.	Toff	753.539 mus	General	Approximate Converter Off Time
23.	Ton Act	1.238 us	General	Approximate Converter On Time
24.	Total BOM	\$0.0	General	Total BOM Cost
25.	Tsw	2.076 us	General	Switching Time Period
26.	Vaux	11.786 V	General	Auxiliary Voltage
27.	Vsnub	43.483 V	General	Voltage Across the Snubber
28.	Vout Actual	4.99 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
29.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
30.	Duty Cycle	59.63 %	Op_point	Duty cycle
31.	Efficiency	81.457 %	Op_point	Steady state efficiency
32.	IC Tj	58.233 degC	Op_point	IC junction temperature
33.	ICThetaJA	97.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
34.	IOUT_OP	2.0 A	Op_point	Iout operating point
35.	M1 TJOP	32.564 degC	Op_point	M1 MOSFET junction temperature
36.	Vout p-p	6.278 mV	Op_point	Peak-to-peak output ripple voltage
37.	Cin Pd	2.246 mW	Power	Input capacitor power dissipation
38.	Cout1 Pd	16.017 mW	Power	Output capacitor1 power dissipation
39.	Dsec Pd	380.514 mW	Power	Secondary Diode Power Dissipation
40.	Dsec2 Pd	397.923 mW	Power	Secondary Diode Power Dissipation
41.	IC Pd	291.064 mW	Power	IC power dissipation
42.	L2 Pd	6.32 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
43.	M1 Pd	46.621 mW	Power	M1 MOSFET total power dissipation
44.	Paux	19.642 mW	Power	Power Dissipation in Raux and Daux
45.	Pd Rstartup	41.58 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
46.	Rdrv Pd	395.168 μW	Power	Power Dissipation in Gate Drive Resistor
47.	Rfb Pd	3.03 mW	Power	Rfb Power Dissipation
48.	Rsns Pd	378.256 mW	Power	Current Limit Sense Resistor Power Dissipation
49.	Snubber Pd	196.763 mW	Power	Snubber Power Dissipation
50.	T1 Pd	1.534 W	Power	Estimated Losses in Transformer

#	Name	Value	Category	Description
51.	Total Pd	0.0 W	Power	Total Power Dissipation
52.	Vout Tolerance	2.173 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
53.	Vout pp percentage	125.559 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	30.0	Maximum input voltage
3.	VinMin	20.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	UC2843A-Q1	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature
8.	UserFsw	98.851 k	Customer Selected Frequency

Design Assistance

1. **UC2843A-Q1** Product Folder : <http://www.ti.com/product/UC2843A%2DQ1> : contains the data sheet and other resources.

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