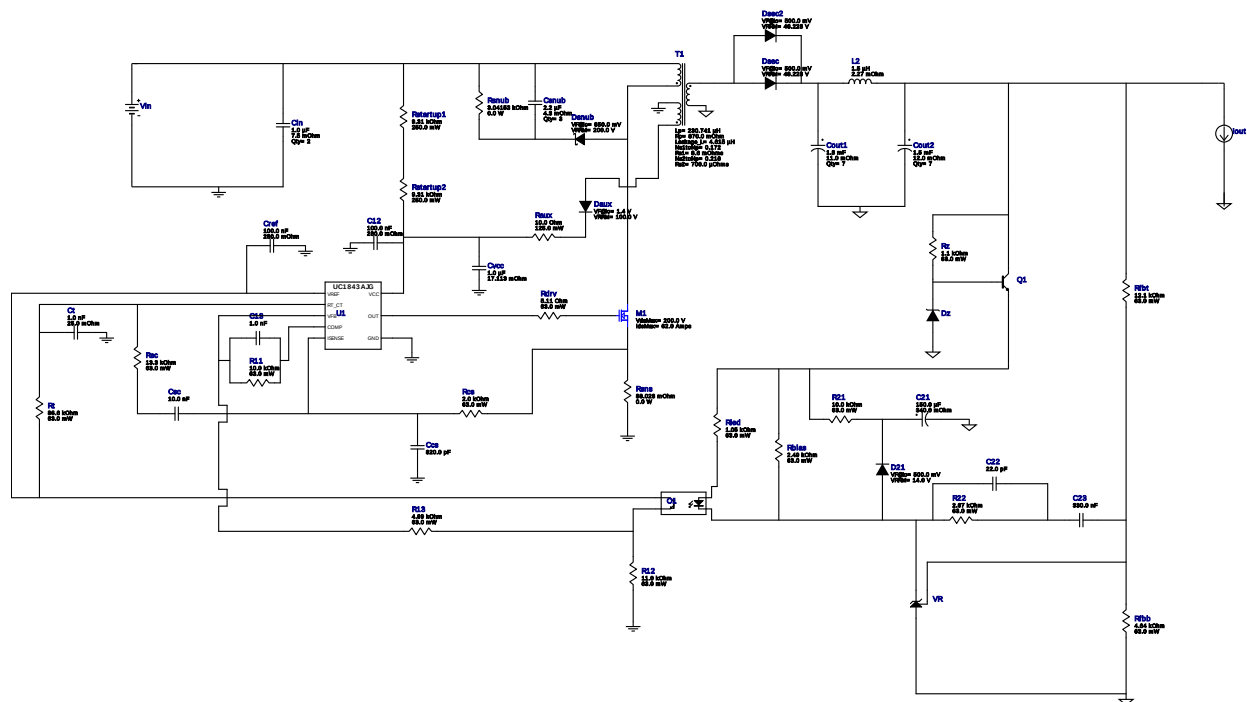


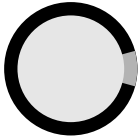
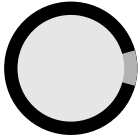
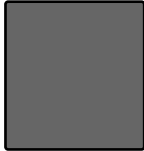
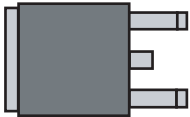
WEBENCH® Design Report

Design : 4161985/28 UC1843AJ
UC1843AJ 40.0V-60.0V to 9.00V @ 16.0A

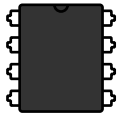


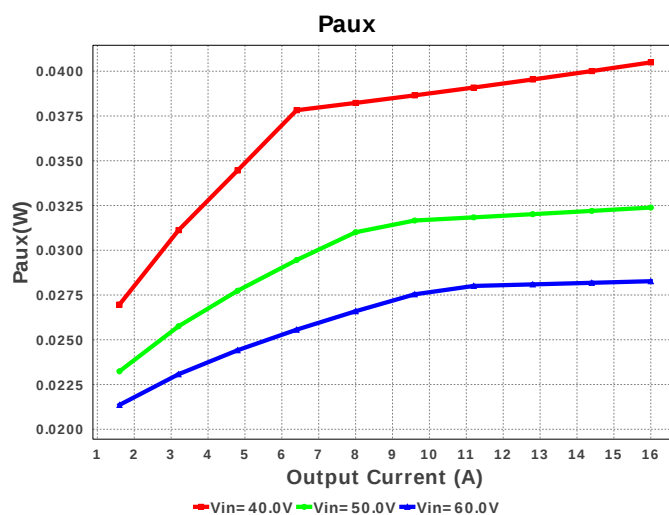
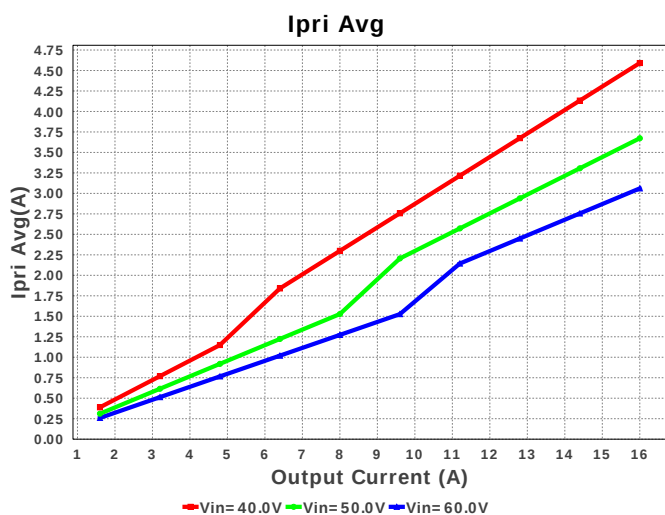
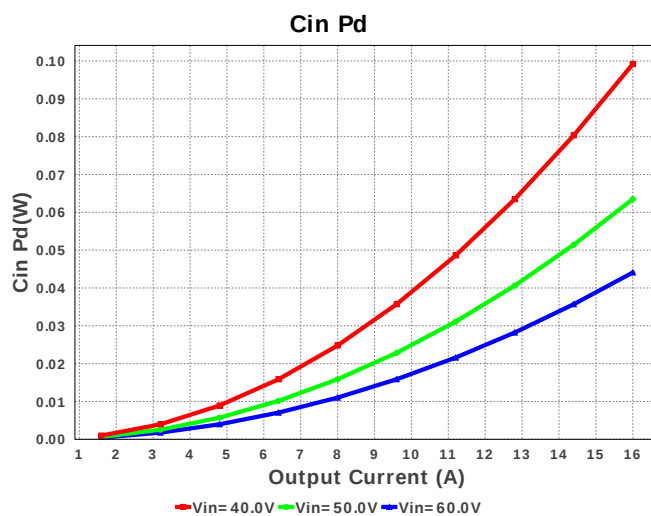
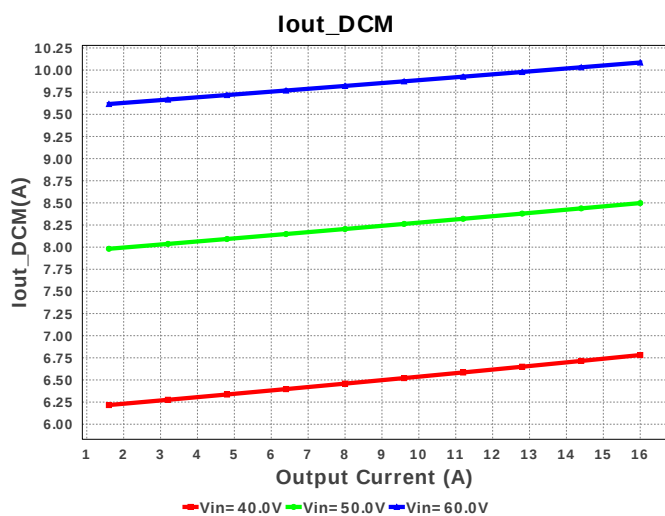
Electrical BOM

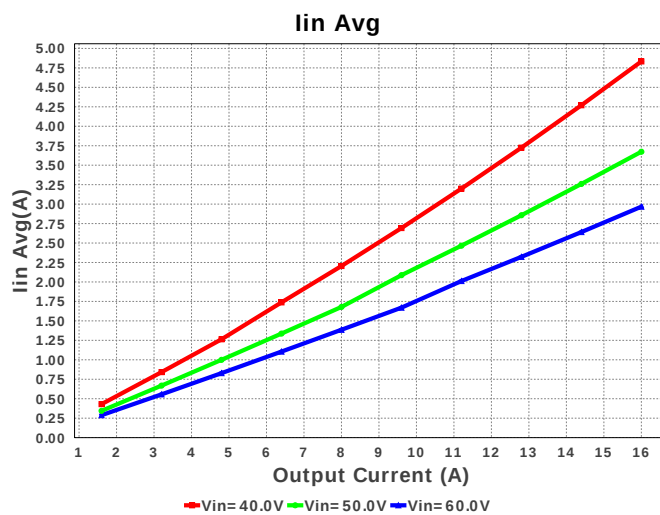
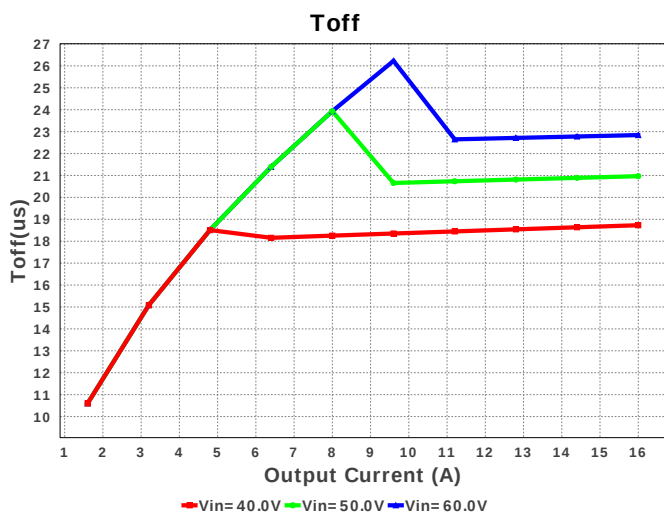
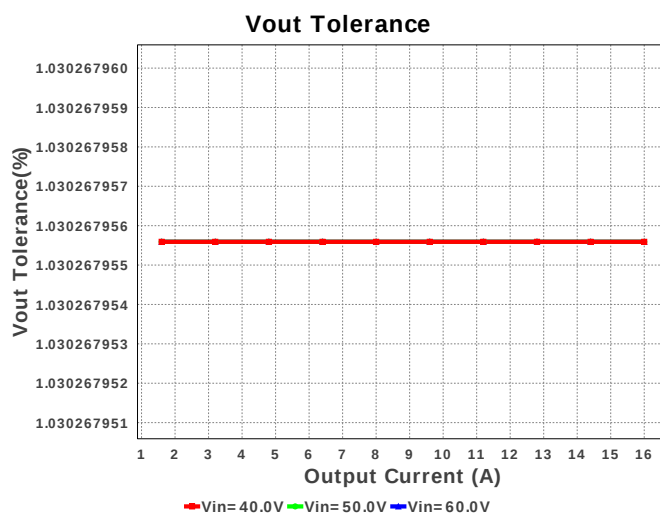
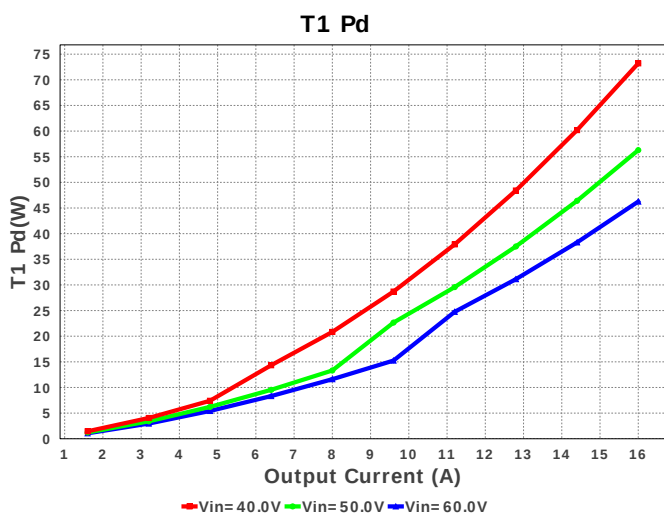
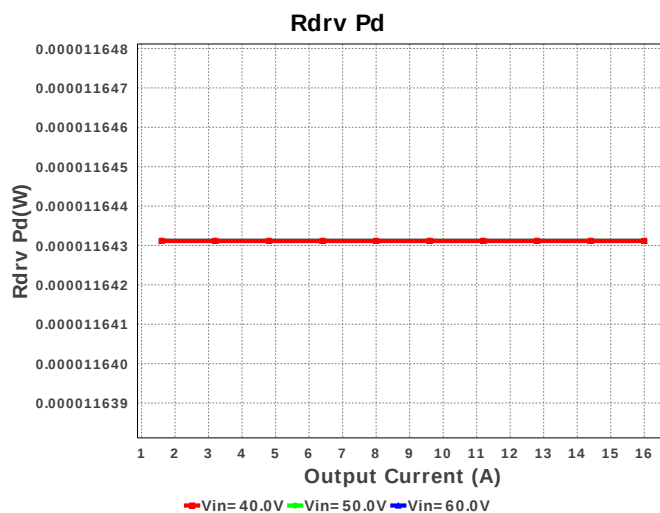
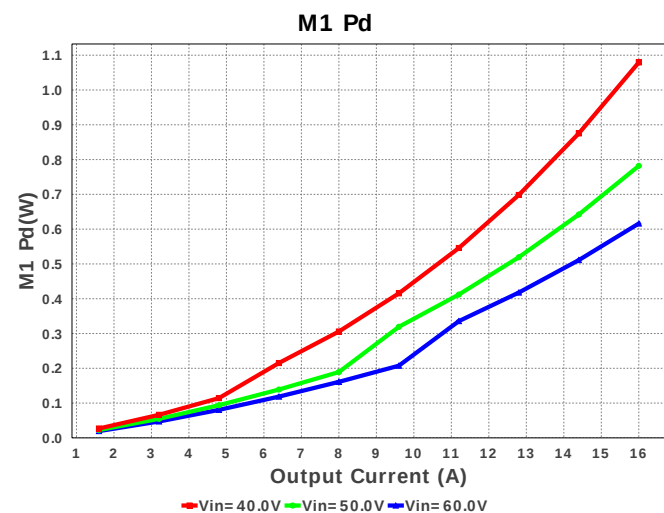
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1.	C12	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	C13	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	C21	Nichicon	UUD1C151MCL1GS Series= uD	Cap= 150.0 uF ESR= 340.0 mOhm VDC= 16.0 V IRMS= 280.0 mA	1	\$0.13	SM_RADIAL_6.3BMM 80 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	MuRata	GRM155R61A334KE15D Series= X5R	Cap= 330.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
6.	Ccs	Yageo America	CC0805KRX7R9BB821 Series= X7R	Cap= 820.0 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	2	\$0.11	1206 11 mm ²

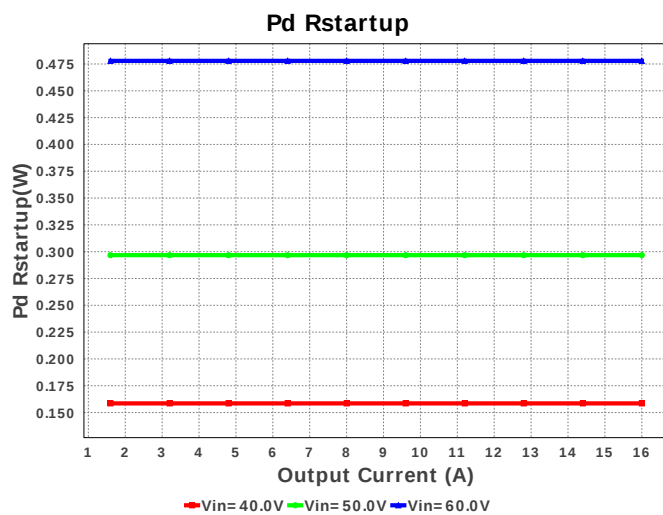
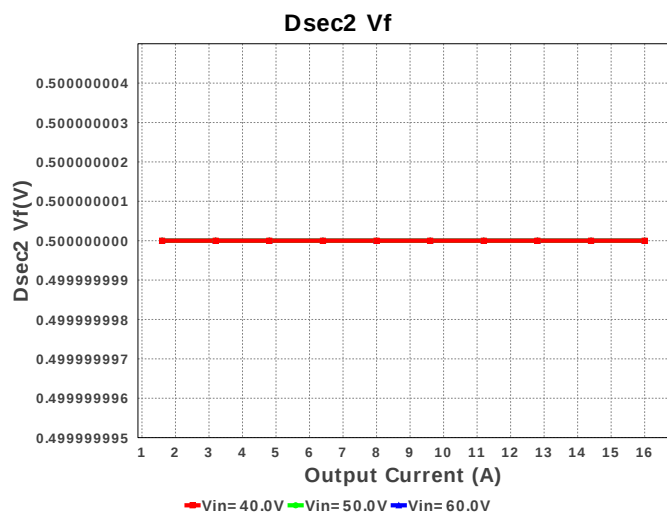
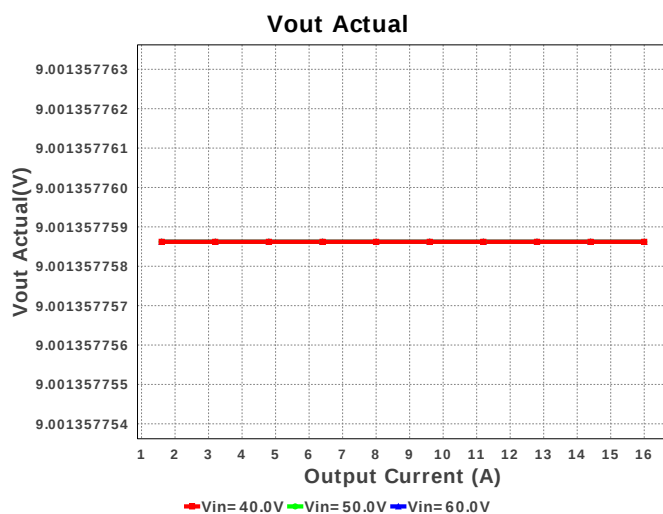
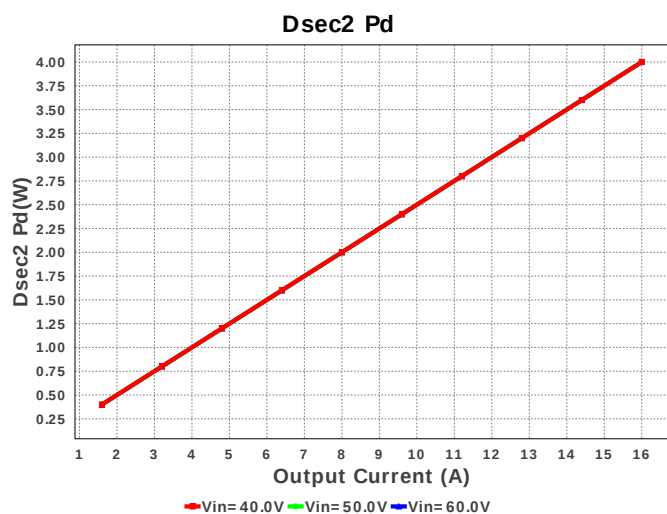
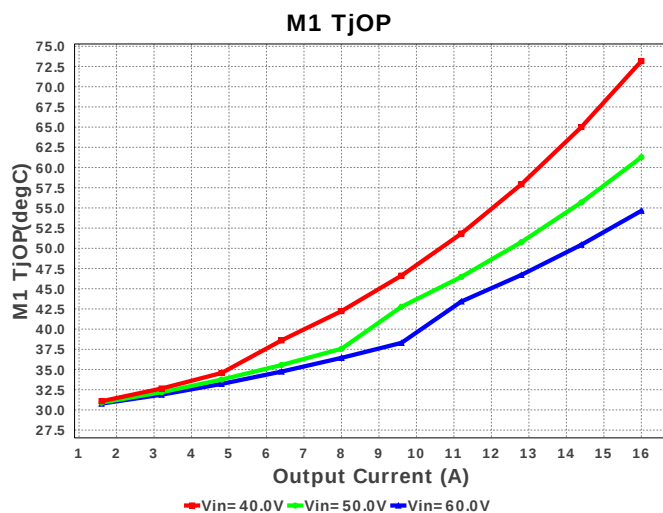
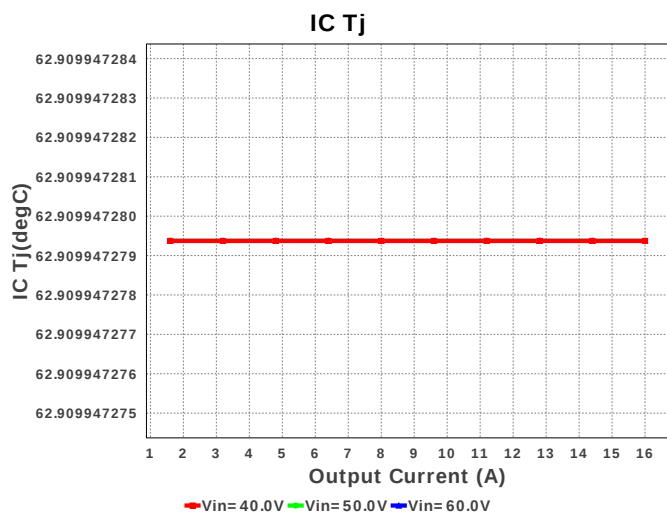
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8.	Cout1	Nichicon	UHV1V182MHD Series= HV	Cap= 1.8 mF ESR= 11.0 mOhm VDC= 35.0 V IRMS= 3.925 A	7	NA	 CAPPR5-12.5X25 210 mm ²
9.	Cout2	Nichicon	UHV1V152MHD Series= HV	Cap= 1.5 mF ESR= 12.0 mOhm VDC= 35.0 V IRMS= 3.795 A	7	NA	 CAPPR5-12.5X25 210 mm ²
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	C5750X6S2W225K Series= X6S	Cap= 2.2 uF ESR= 4.3 mOhm VDC= 400.0 V IRMS= 0.0 A	3	NA	 2220 54 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	GRM188R61E105KA12D Series= X5R	Cap= 1.0 uF ESR= 17.113 mOhm VDC= 25.0 V IRMS= 979.39 mA	1	\$0.01	 0603 5 mm ²
15.	D21	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 14.0 V	1	NA	CUSTOM 0 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	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 48.228 V	1	NA	CUSTOM 0 mm ²
18.	Dsec2	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 48.228 V	1	NA	CUSTOM 0 mm ²
19.	Dsnub	Diodes Inc.	DFLS1200-7	VF@Io= 850.0 mV VRRM= 200.0 V	1	\$0.21	 PowerDI123 13 mm ²
20.	Dz	ON Semiconductor	BZX84C6V2LT1G	Zener	1	\$0.02	 SOT-23 14 mm ²
21.	L2	Coiltronics	HC9-1R5-R	L= 1.5 uH DCR= 2.27 mOhm	1	\$1.32	 HC9 243 mm ²
22.	M1	Fairchild Semiconductor	FDB2614	VdsMax= 200.0 V IdsMax= 62.0 Amps	1	\$2.01	 DDPAK 210 mm ²
23.	O1	Vishay-Semiconductor	TCMT1107	Optocoupler	1	\$0.21	 SOP-4 44 mm ²
24.	Q1	ON Semiconductor	BC848CLT1G	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm ²

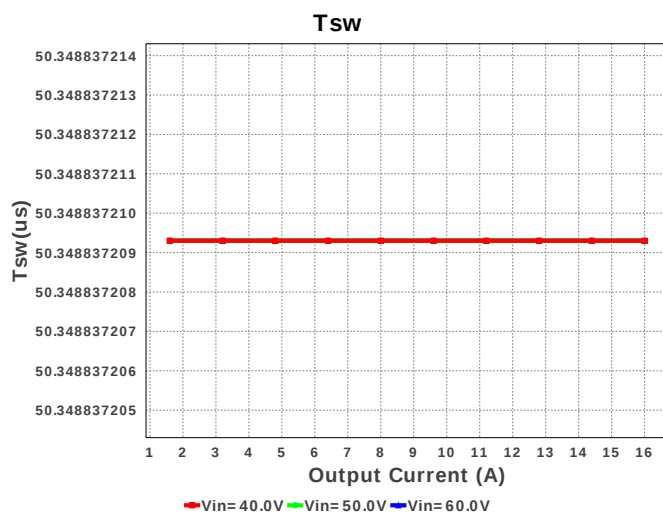
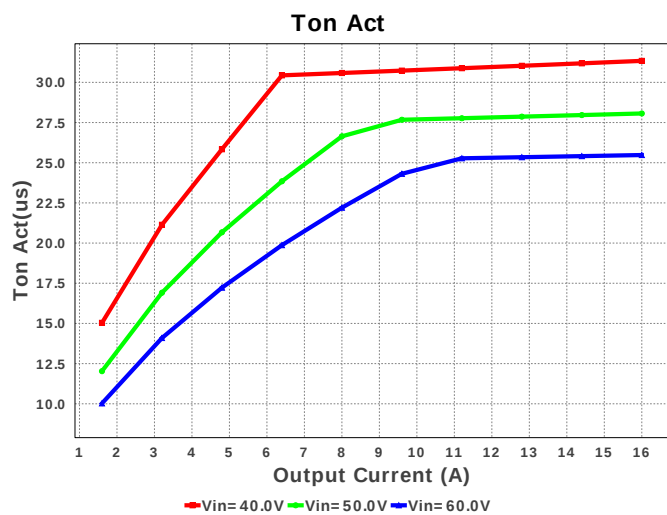
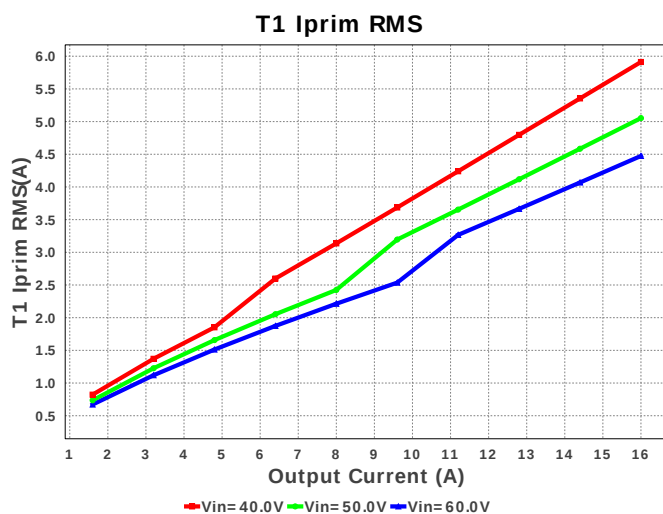
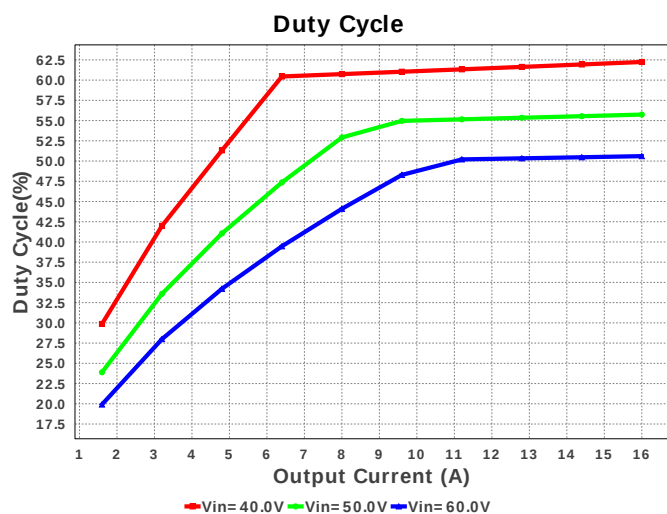
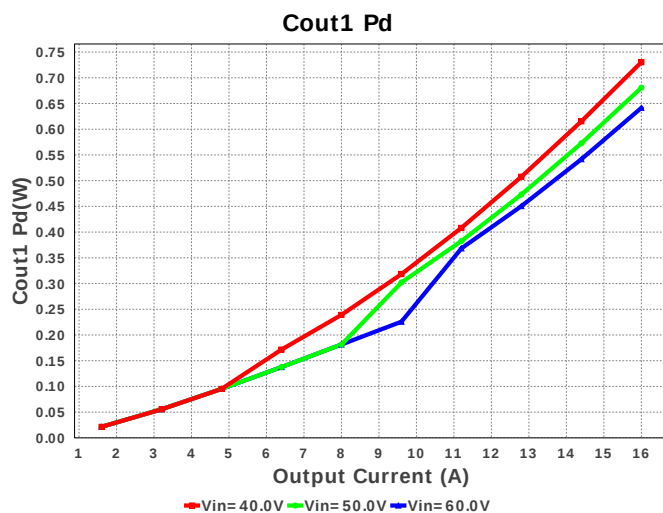
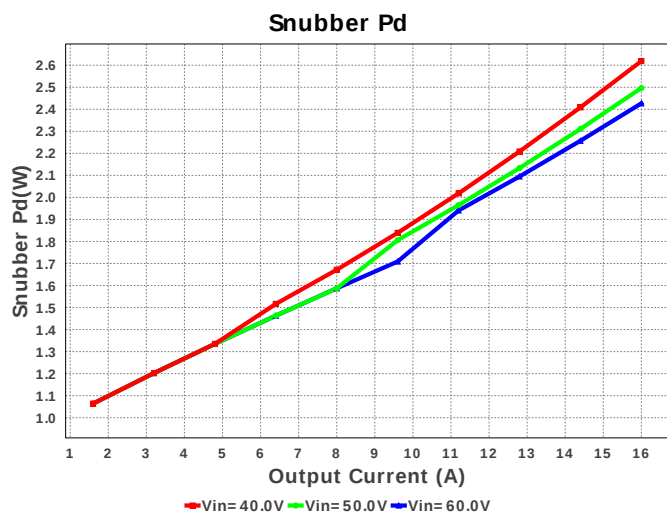
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
25.	R11	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
26.	R12	Vishay-Dale	CRCW040211K0FKED Series= CRCW..e3	Res= 11.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 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	CRCW04022K67FKED Series= CRCW..e3	Res= 2.67 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
30.	Raux	Vishay-Dale	CRCW080510R0FKEA Series= CRCW..e3	Res= 10.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
31.	Rbias	Vishay-Dale	CRCW04022K49FKED Series= CRCW..e3	Res= 2.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 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	CRCW04025R11FKED Series= CRCW..e3	Res= 5.11 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
34.	Rfbb	Vishay-Dale	CRCW04024K64FKED Series= CRCW..e3	Res= 4.64 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
35.	Rfbt	Vishay-Dale	CRCW040212K1FKED Series= CRCW..e3	Res= 12.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
36.	Rled	Vishay-Dale	CRCW04021K05FKED Series= CRCW..e3	Res= 1.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
37.	Rsc	Vishay-Dale	CRCW040213K3FKED Series= CRCW..e3	Res= 13.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
38.	Rsns	CUSTOM	CUSTOM Series= ?	Res= 88.028 mOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm ²
39.	Rsnub	CUSTOM	CUSTOM Series= ?	Res= 3.04153 kOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm ²
40.	Rstartup1	Panasonic	ERJ-8ENF9311V Series= ERJ-8E	Res= 9.31 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
41.	Rstartup2	Panasonic	ERJ-8ENF9311V Series= ERJ-8E	Res= 9.31 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
42.	Rt	Vishay-Dale	CRCW040286K6FKED Series= CRCW..e3	Res= 86.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
43.	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

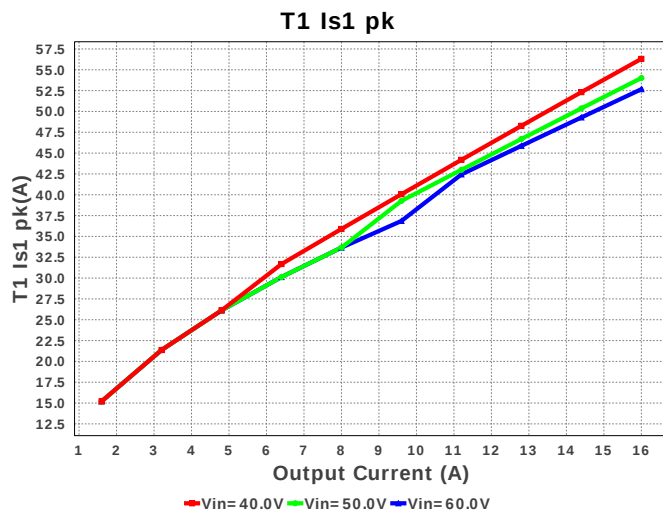
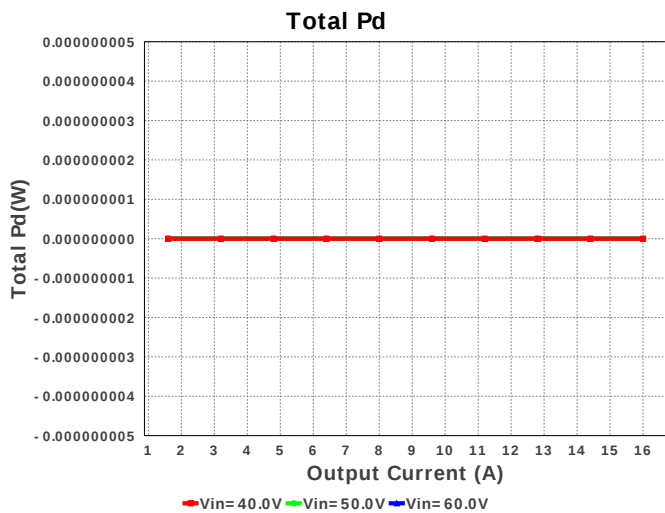
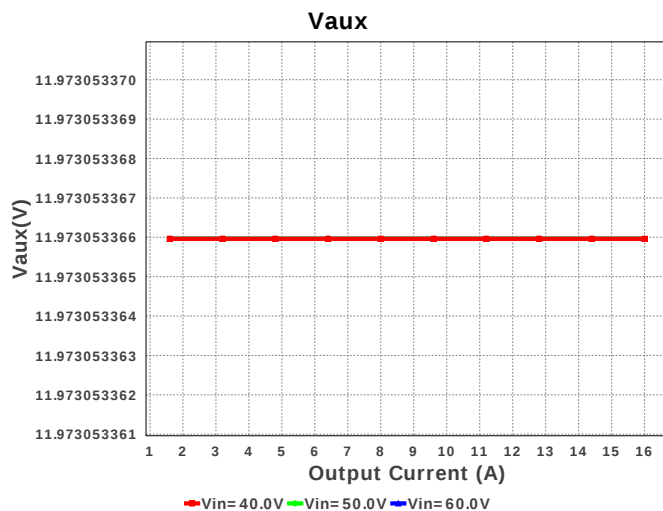
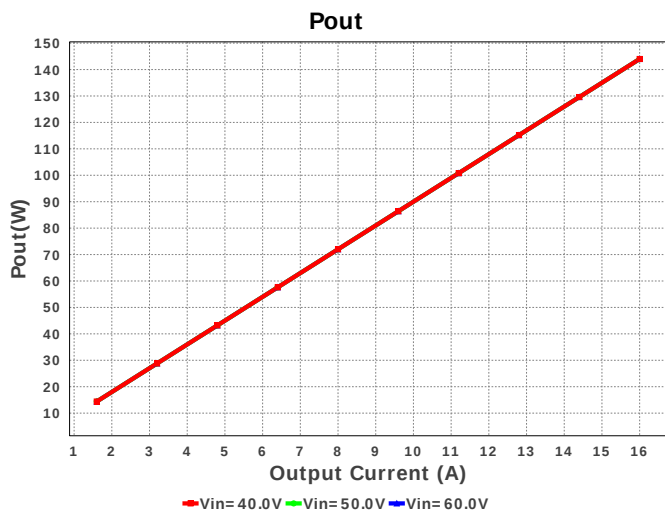
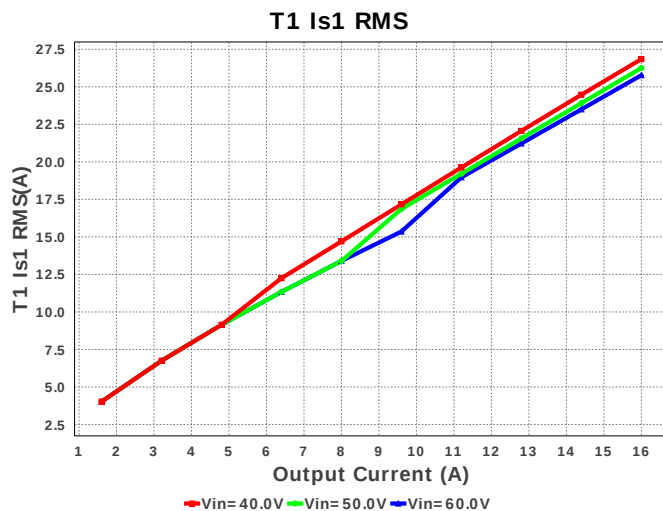
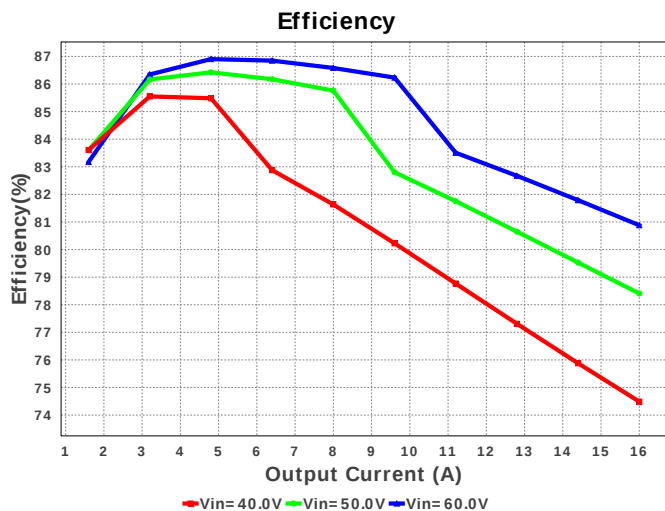
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
44.	T1	CUSTOM	CUSTOM	Lp= 230.741 μ H Rp= 870.0 mOhm Leakage_L= 4.615 μ H Ns1toNp= 0.172 Rs1= 8.6 mOhms Ns2toNp= 0.216 Rs2= 700.0 μ Ohms	1	NA	CUSTOM 0 mm ²
45.	U1	Texas Instruments	UC1843AJ	Switcher	1	NA	 JG0008A 111 mm ²
46.	VR	Texas Instruments	TL431AIDBZR	Voltage References	1	\$0.08	 DBZ0003A 14 mm ²

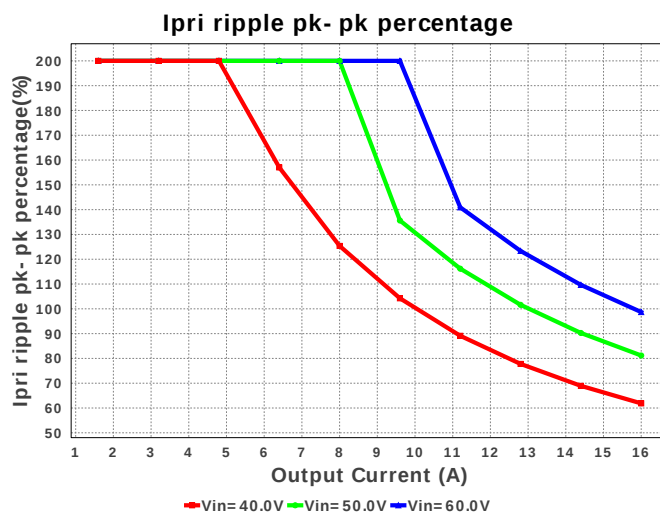
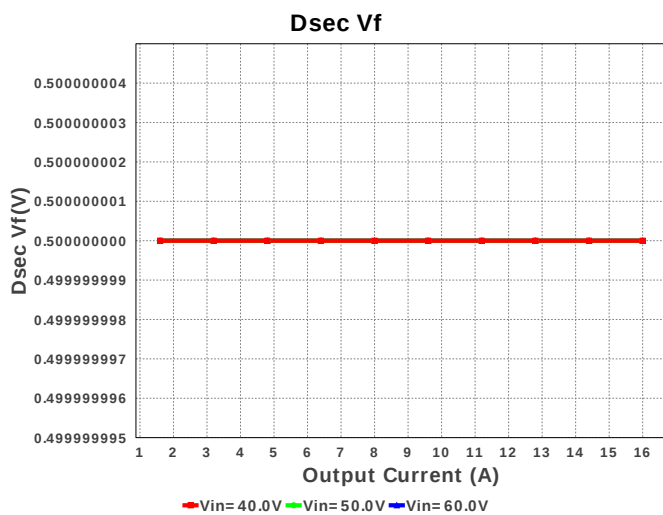
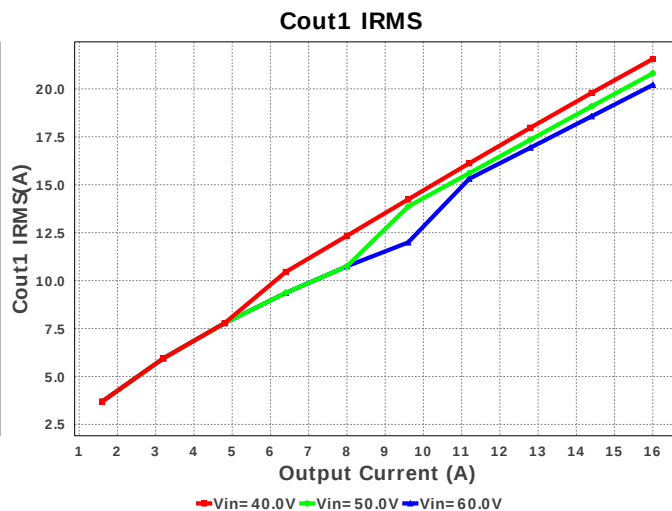
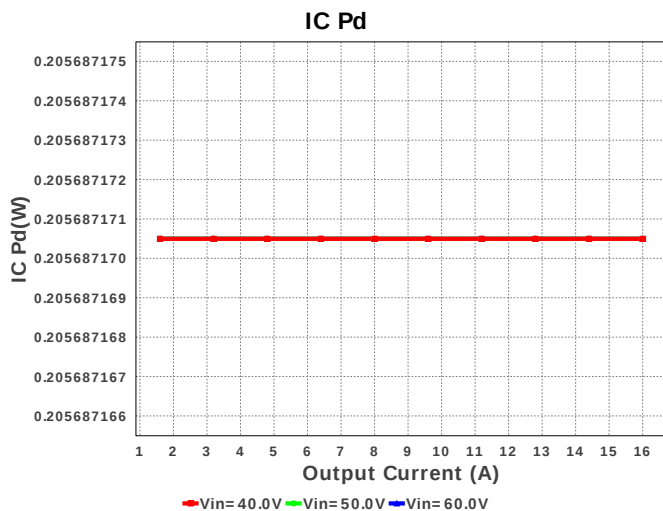
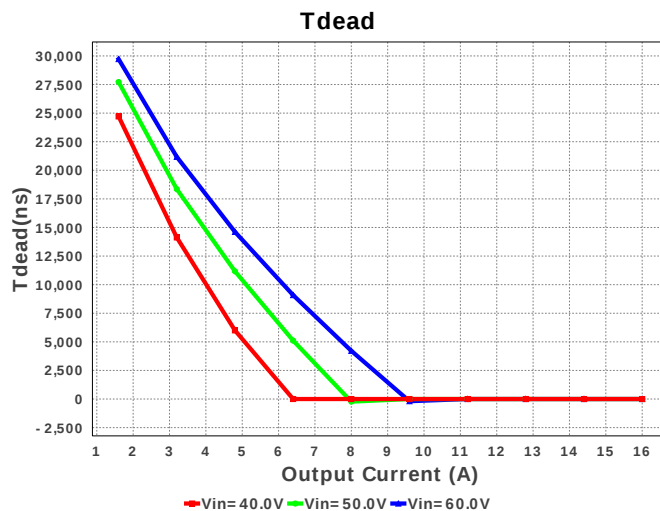
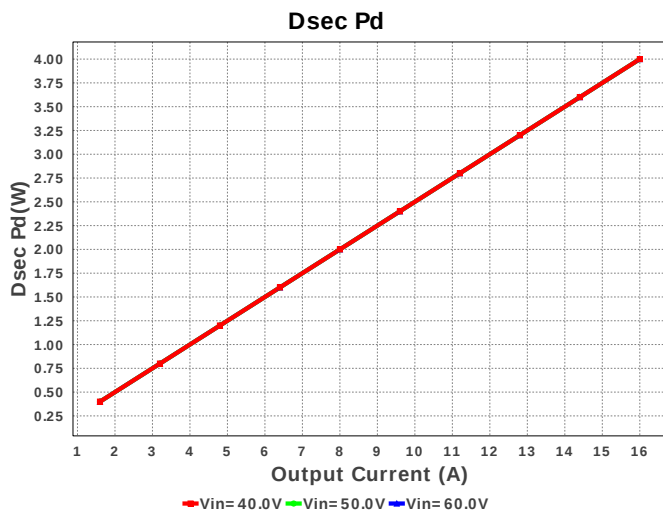


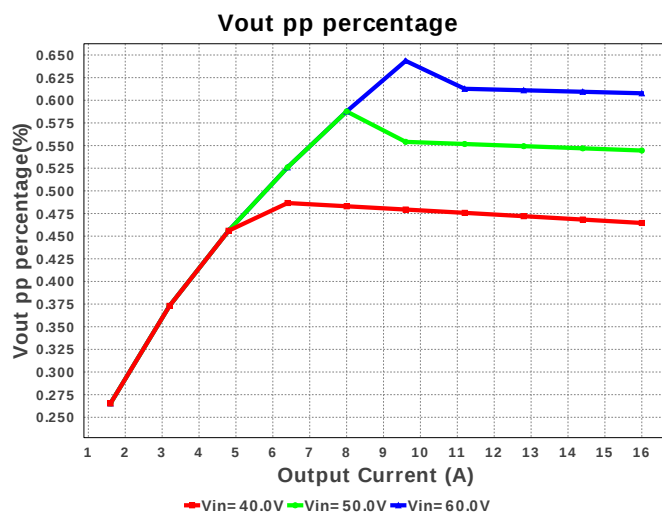
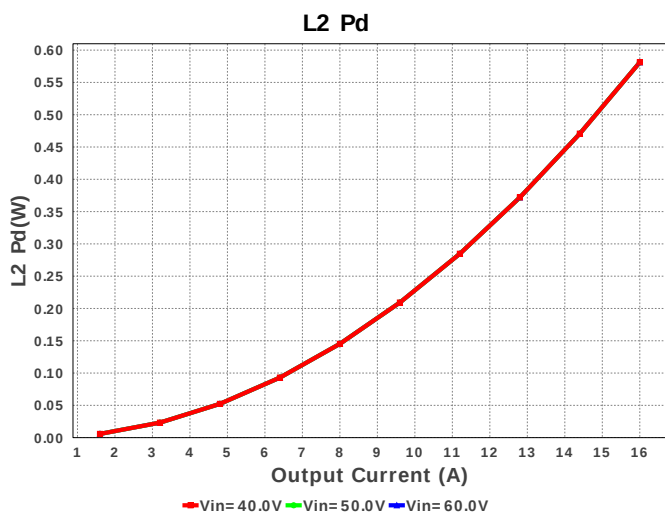
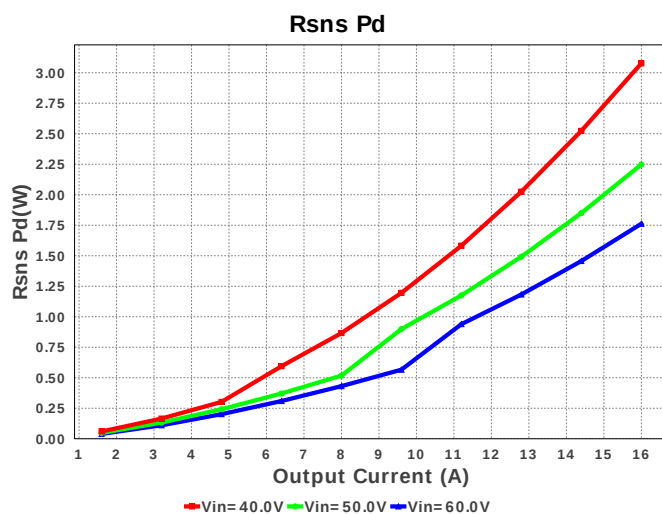
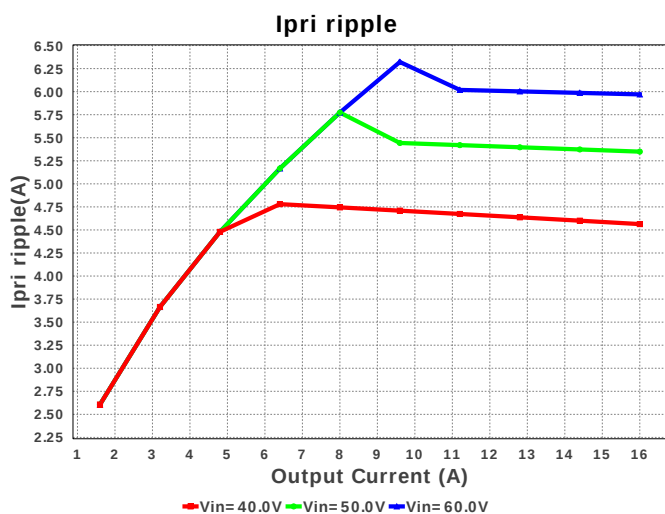
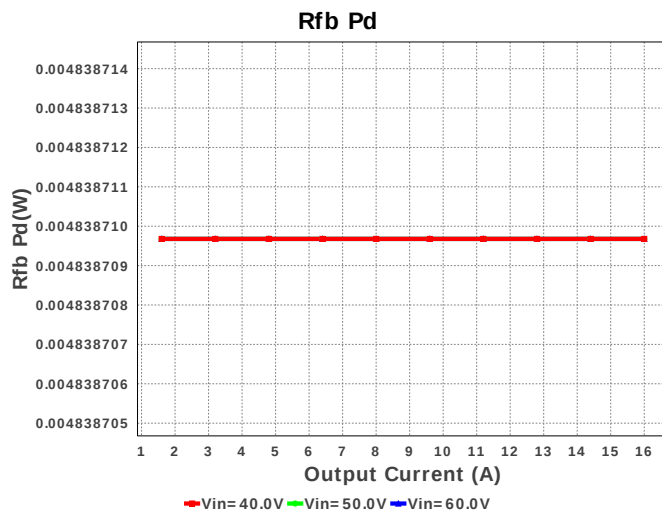
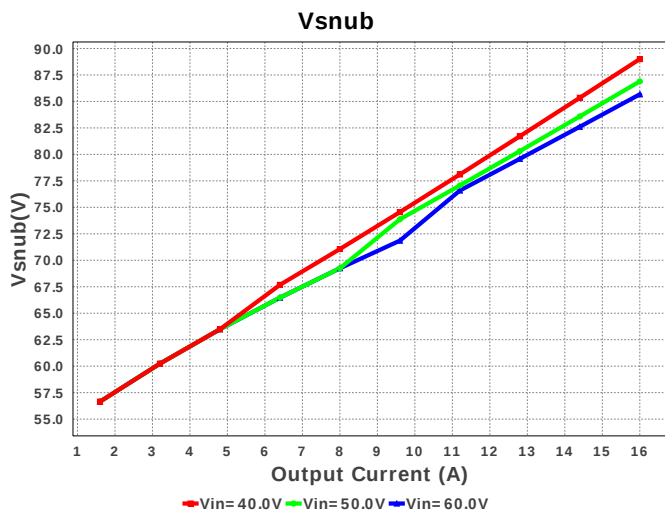


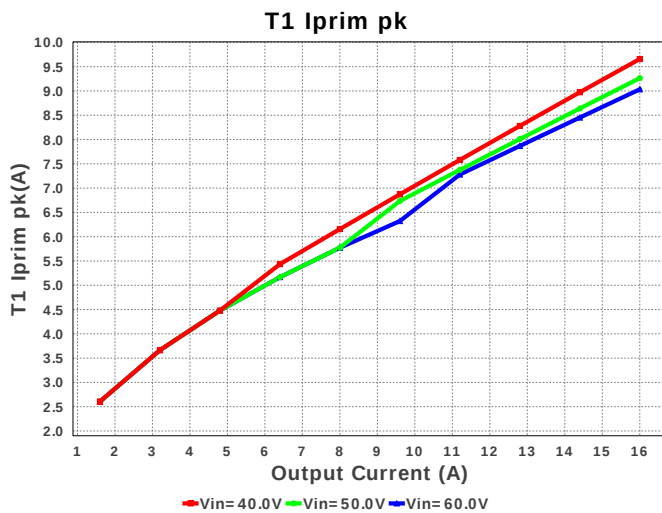
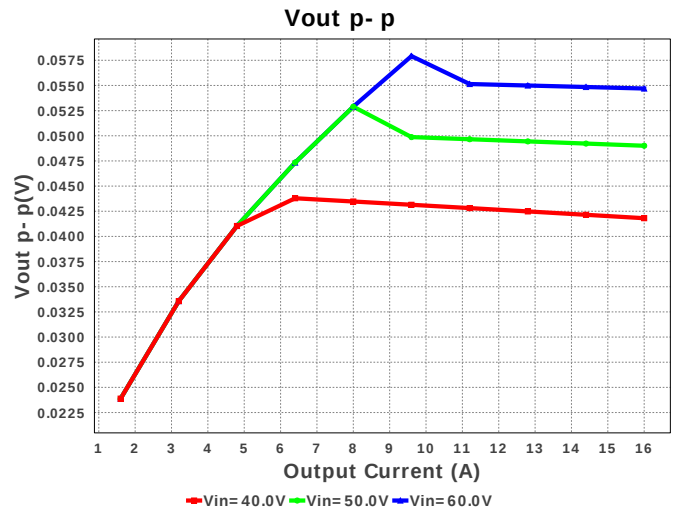
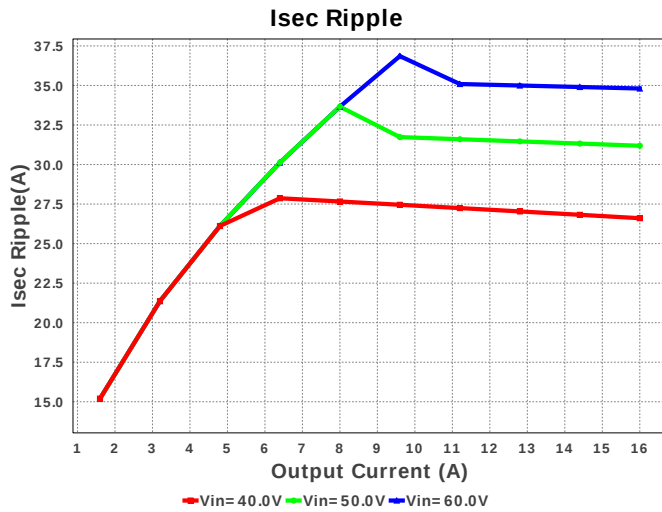












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	21.557 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	4.833 A	Current	Average input current
3.	Iout_DCM	6.781 A	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	4.591 A	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	4.563 A	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	61.863 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	26.606 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	5.912 A	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	9.659 A	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	26.846 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	56.311 A	Current	Transformer Secondary1 Peak Current
12.	BOM Count	61	General	Total Design BOM count
13.	Daux trr	4.0 ns	General	Auxiliary Diode Reverse Recovery Time
14.	Dsec Vf	500.0 mV	General	Effective Forward Voltage Drop at the Operating Current
15.	Dsec trr	60.0 ns	General	Output Diode Reverse Recovery Time
16.	Dsec2 Vf	500.0 mV	General	Effective Forward Voltage Drop at the Operating Current
17.	Dsnub trr	0.0 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	4.129 k mm ²	General	Total Foot Print Area of BOM components
19.	Frequency	19.861 kHz	General	Switching frequency
20.	Pout	144.0 W	General	Total output power
21.	Tdead	0.0 ns	General	Approximate Dead Time of the Regulator
22.	Toff	18.731 us	General	Approximate Converter Off Time
23.	Ton Act	31.337 us	General	Approximate Converter On Time
24.	Total BOM	\$0.0	General	Total BOM Cost
25.	Tsw	50.349 us	General	Switching Time Period
26.	Vaux	11.973 V	General	Auxiliary Voltage
27.	Vsnub	88.998 V	General	Voltage Across the Snubber
28.	Vout Actual	9.001 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
29.	Vout OP	9.0 V	Op_Point	Operational Output Voltage

#	Name	Value	Category	Description
30.	Duty Cycle	62.241 %	Op_point	Duty cycle
31.	Efficiency	74.488 %	Op_point	Steady state efficiency
32.	IC Tj	62.91 degC	Op_point	IC junction temperature
33.	ICThetaJA	160.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
34.	IOUT_OP	16.0 A	Op_point	Iout operating point
35.	M1 TjOP	73.171 degC	Op_point	M1 MOSFET junction temperature
36.	Vout p-p	41.809 mV	Op_point	Peak-to-peak output ripple voltage
37.	Cin Pd	99.184 mW	Power	Input capacitor power dissipation
38.	Cout1 Pd	730.254 mW	Power	Output capacitor1 power dissipation
39.	Dsec Pd	4.0 W	Power	Secondary Diode Power Dissipation
40.	Dsec2 Pd	4.0 W	Power	Secondary Diode Power Dissipation
41.	IC Pd	205.687 mW	Power	IC power dissipation
42.	L2 Pd	581.12 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
43.	M1 Pd	1.079 W	Power	M1 MOSFET total power dissipation
44.	Paux	40.493 mW	Power	Power Dissipation in Raux and Daux
45.	Pd Rstartup	158.542 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
46.	Rdrv Pd	11.643 μ W	Power	Power Dissipation in Gate Drive Resistor
47.	Rfb Pd	4.839 mW	Power	Rfb Power Dissipation
48.	Rsns Pd	3.077 W	Power	Current Limit Sense Resistor Power Dissipation
49.	Snubber Pd	2.619 W	Power	Snubber Power Dissipation
50.	T1 Pd	73.208 W	Power	Estimated Losses in Transformer
51.	Total Pd	0.0 W	Power	Total Power Dissipation
52.	Vout Tolerance	1.03 %		Vout Tolerance based on IC Tolerance and voltage divider resistors if applicable
53.	Vout pp percentage	464.55 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	16.0	Maximum Output Current
2.	VinMax	60.0	Maximum input voltage
3.	VinMin	40.0	Minimum input voltage
4.	Vout	9.0	Output Voltage
5.	base_pn	UC1843A	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. UC1843A Product Folder : <http://www.ti.com/lit/ds/symlink/uc1842a.pdf> : contains the data sheet and other resources.

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