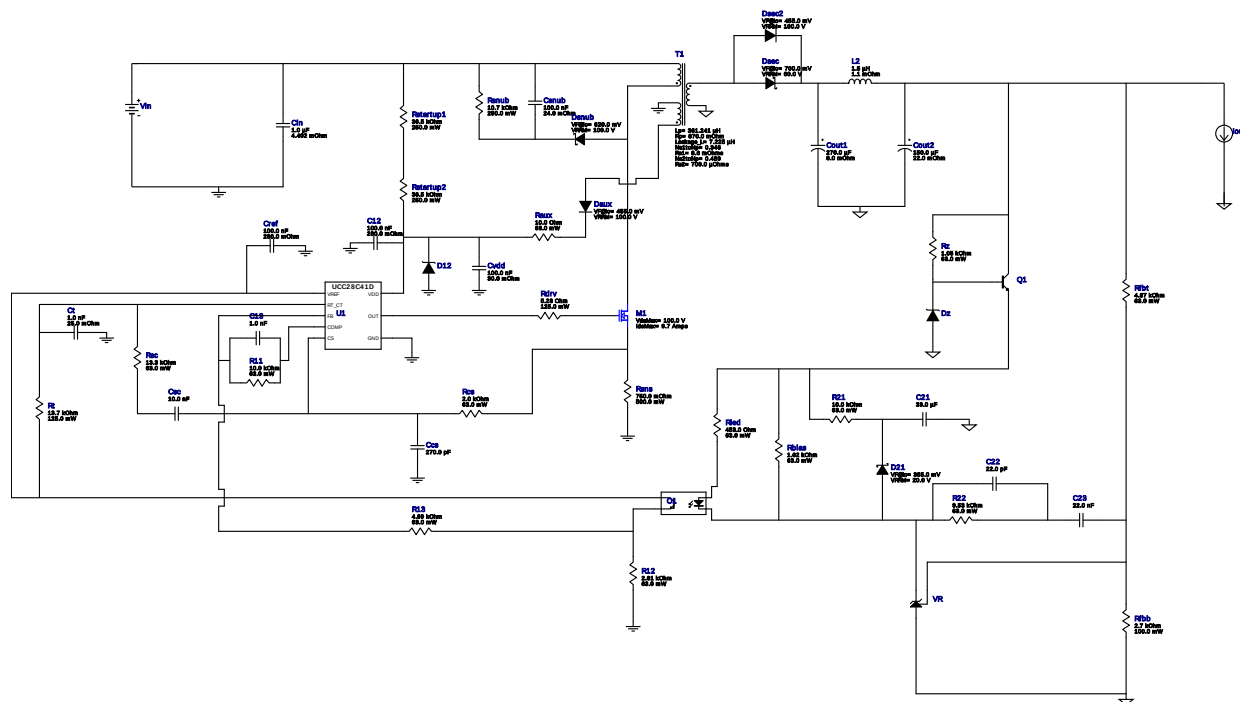


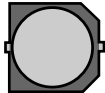
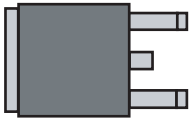
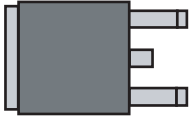
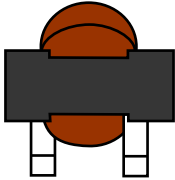
WEBENCH® Design Report

Design : 4738744/34 UCC28C41DR
UCC28C41DR 35.0V-40.0V to 7.00V @ 1.0A



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
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	MuRata	KCM55WR7YA336MH01K Series= X7R	Cap= 33.0 uF VDC= 35.0 V IRMS= 0.0 A	1	\$1.51	 KCM55W 59 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	CC0805KRX7R9BB223 Series= X7R	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
6.	Ccs	Yageo America	CC0805KRX7R9BB271 Series= X7R	Cap= 270.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 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
8.	Cout1	Panasonic	16SVPG270M Series= ?	Cap= 270.0 uF ESR= 8.0 mOhm VDC= 16.0 V IRMS= 5.8 A	1	\$0.70	 CAPSMT_62_C10 74 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cout2	Panasonic	16SVPC150M Series= SVPC	Cap= 150.0 uF ESR= 22.0 mOhm VDC= 16.0 V IRMS= 3.22 A	1	\$0.66	 SM_RADIAL_8MM 113 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	AVX	08055C104JAT2A Series= X7R	Cap= 100.0 nF ESR= 24.0 mOhm VDC= 50.0 V IRMS= 0.0 A	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.	Cvdd	MuRata	GRM188R71C104KA01D Series= X7R	Cap= 100.0 nF ESR= 30.0 mOhm VDC= 16.0 V IRMS= 1.7 A	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	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	\$0.06	 SOD-123 13 mm ²
17.	Daux	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm ²
18.	Dsec	Diodes Inc.	B360A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	\$0.12	 SMA 37 mm ²
19.	Dsec2	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm ²
20.	Dsnub	Vishay-Semiconductor	SS2PH10-M3	VF@Io= 620.0 mV VRRM= 100.0 V	1	\$0.14	DO-220AA 14 mm ²
21.	Dz	Diodes Inc.	MMSZ5231B-7-F	Zener	1	\$0.03	 SOD-123 13 mm ²
22.	L2	Coilcraft	SER1590-152MLB	L= 1.5 uH DCR= 1.1 mOhm	1	\$1.12	 SER1590 324 mm ²
23.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 9.7 Amps	1	\$0.75	 TRANS_NexFET_Q3 18 mm ²
24.	O1	Vishay-Semiconductor	TCMT1107	Optocoupler	1	\$0.21	 SOP-4 44 mm ²

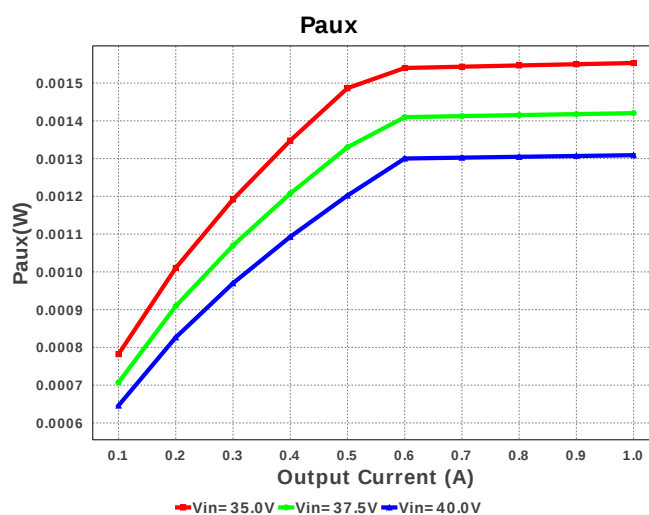
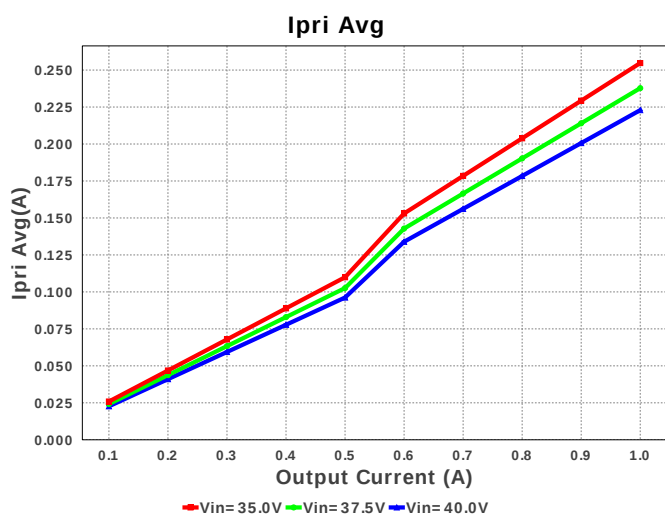
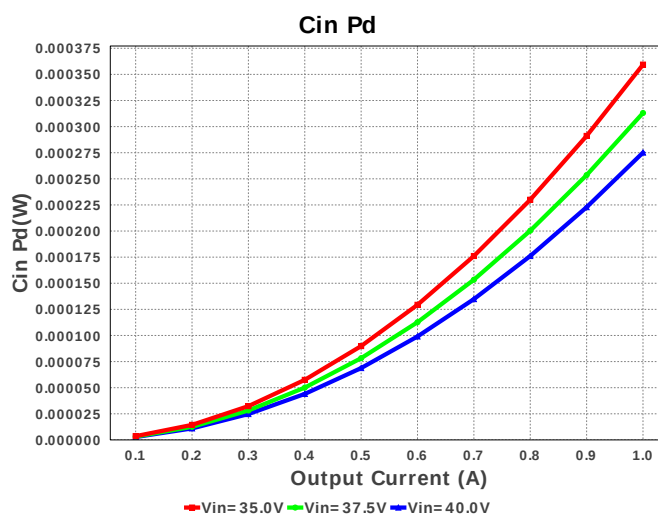
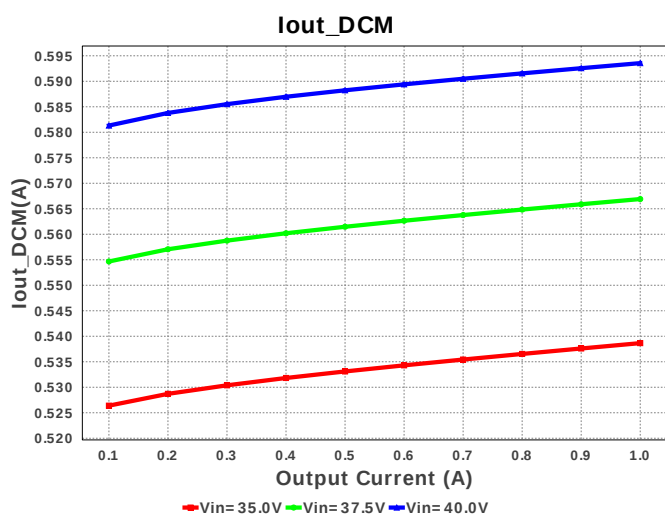
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
25.	Q1	ON Semiconductor	BC846BLT1G	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm ²
26.	R11	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
27.	R12	Vishay-Dale	CRCW04022K61FKED Series= CRCW..e3	Res= 2.61 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	CRCW04029K53FKED Series= CRCW..e3	Res= 9.53 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	CRCW04021K62FKED Series= CRCW..e3	Res= 1.62 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	Yageo America	RC0805FR-075R23L Series= ?	Res= 5.23 Ohm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
35.	Rfbb	Yageo America	RC0603FR-072K7L Series= ?	Res= 2.7 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
36.	Rfbt	Vishay-Dale	CRCW04024K87FKED Series= CRCW..e3	Res= 4.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
37.	Rled	Vishay-Dale	CRCW0402453RFKED Series= CRCW..e3	Res= 453.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
38.	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
39.	Rsns	Rohm	MCR25JZHFLR750 Series= MCR25	Res= 750.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.03	 1210 15 mm ²
40.	Rsnub	Panasonic	ERJ-8ENF1072V Series= ERJ-8E	Res= 10.7 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
41.	Rstartup1	Panasonic	ERJ-8ENF3652V Series= ERJ-8E	Res= 36.5 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
42.	Rstartup2	Panasonic	ERJ-8ENF3652V Series= ERJ-8E	Res= 36.5 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
43.	Rt	Panasonic	ERJ-6ENF1372V Series= ERJ-6E	Res= 13.7 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
44.	Rz	Vishay-Dale	CRCW04021K05FKED Series= CRCW..e3	Res= 1.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

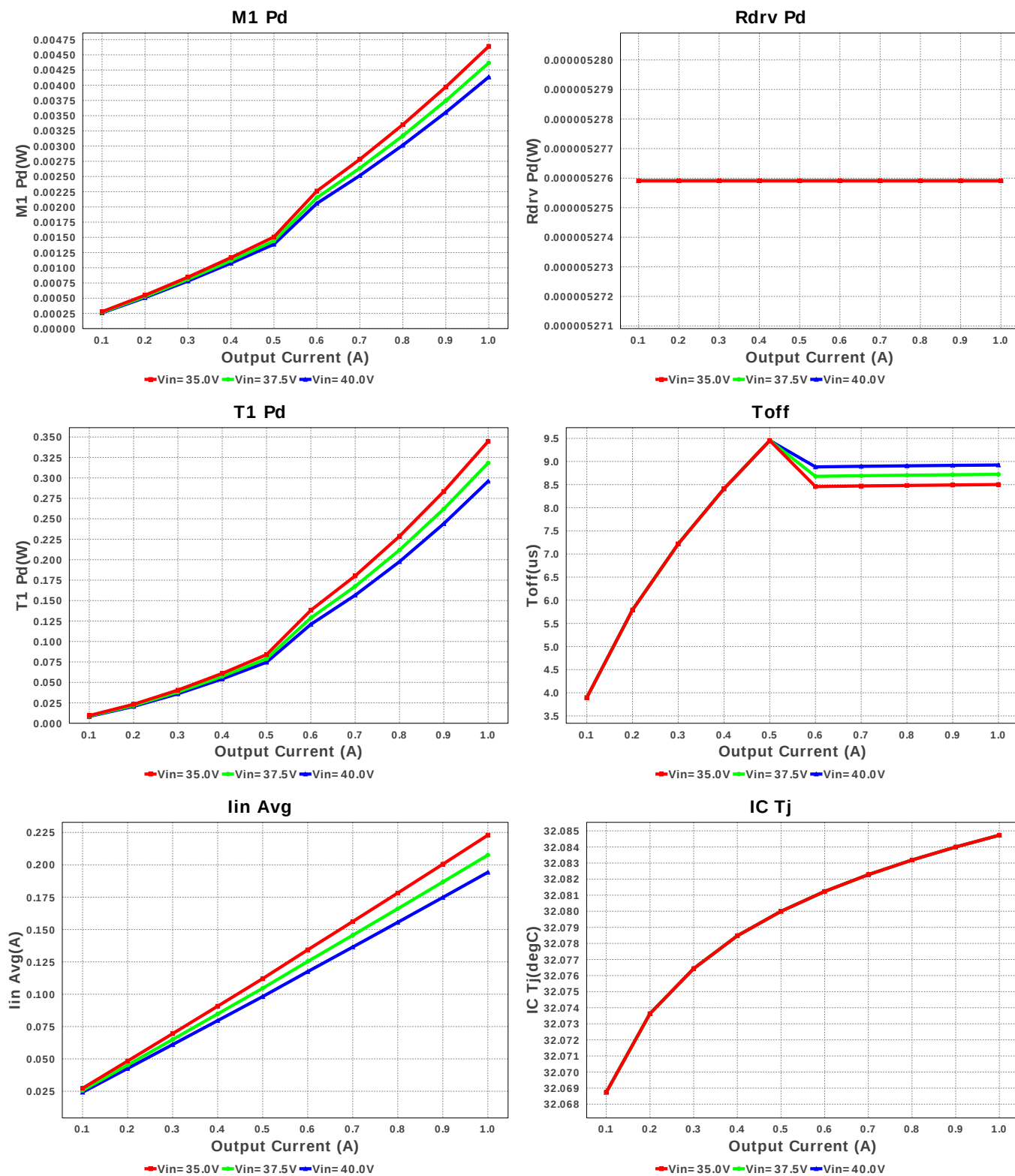
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
45.	T1	CUSTOM	CUSTOM	Lp= 361.241 μ H Rp= 870.0 mOhm Leakage_L= 7.225 μ H Ns1toNp= 0.346 Rs1= 8.6 mOhms Ns2toNp= 0.489 Rs2= 700.0 μ Ohms	1	NA	CUSTOM 0 mm ²

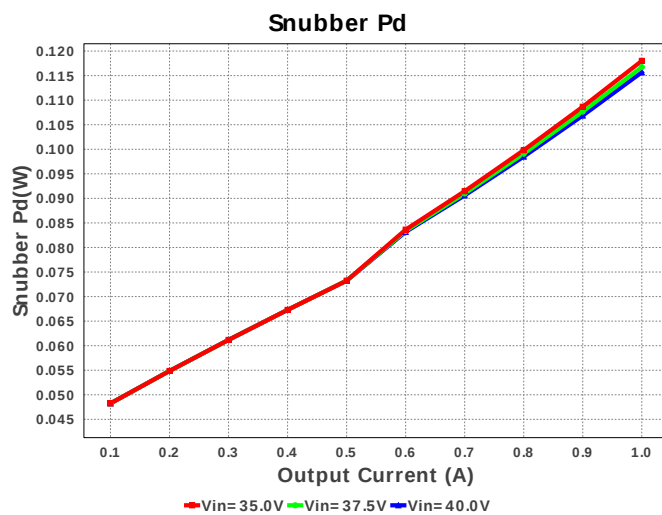
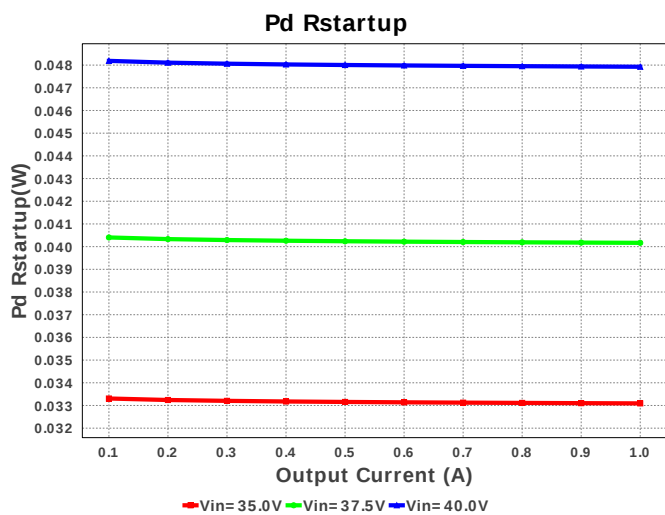
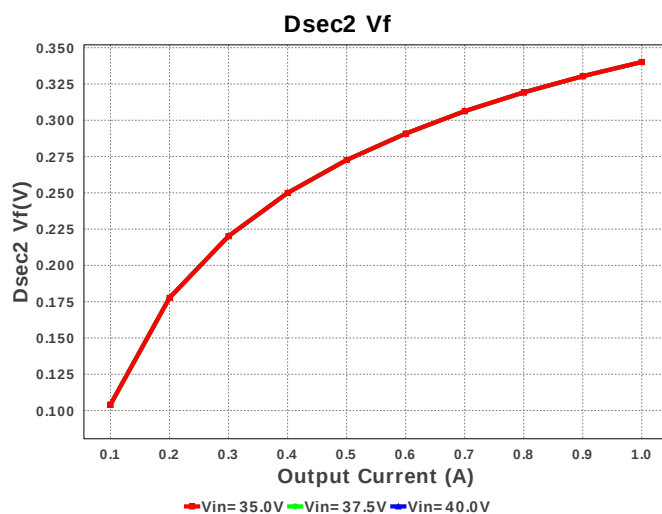
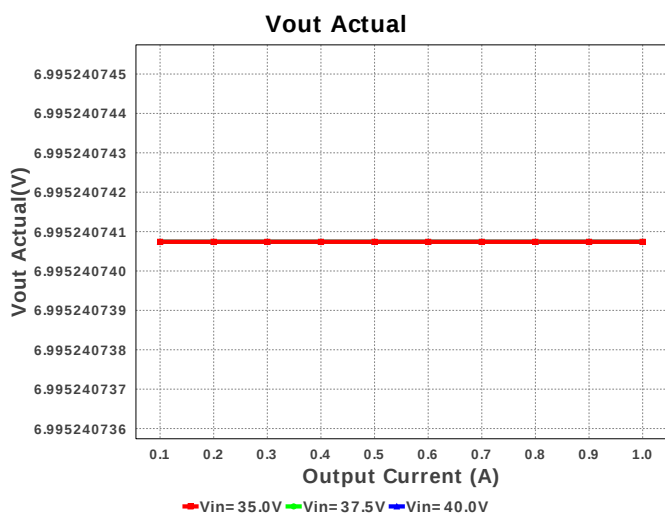
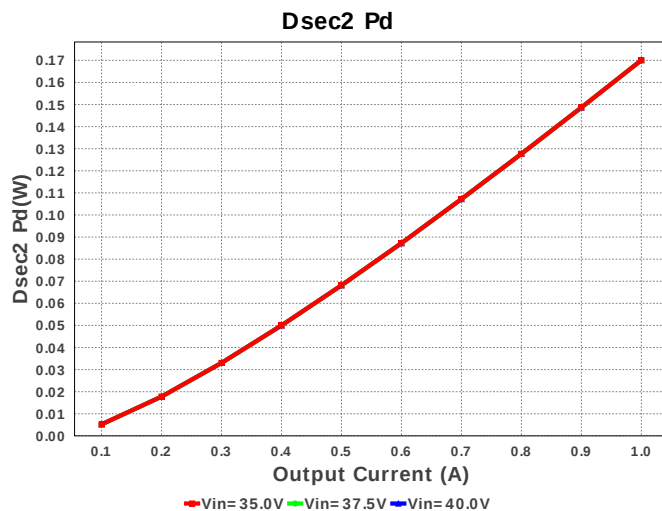
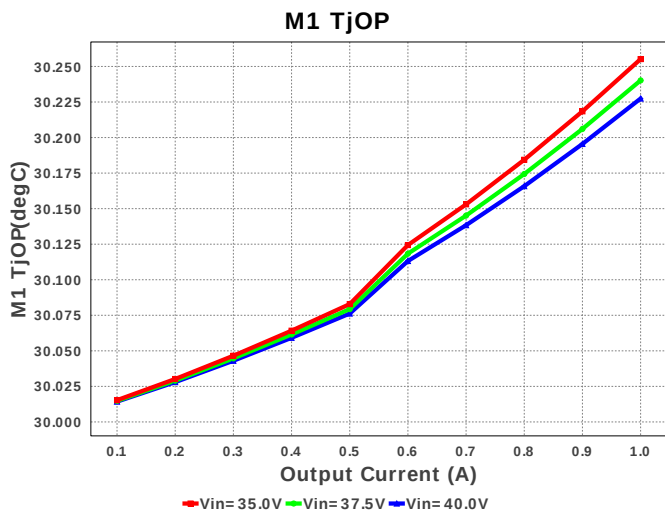
46.	U1	Texas Instruments	UCC28C41DR	Switcher	1	\$0.75	
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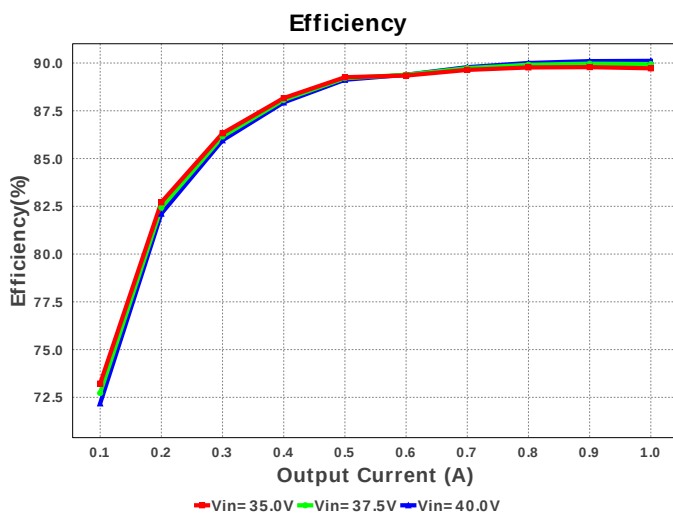
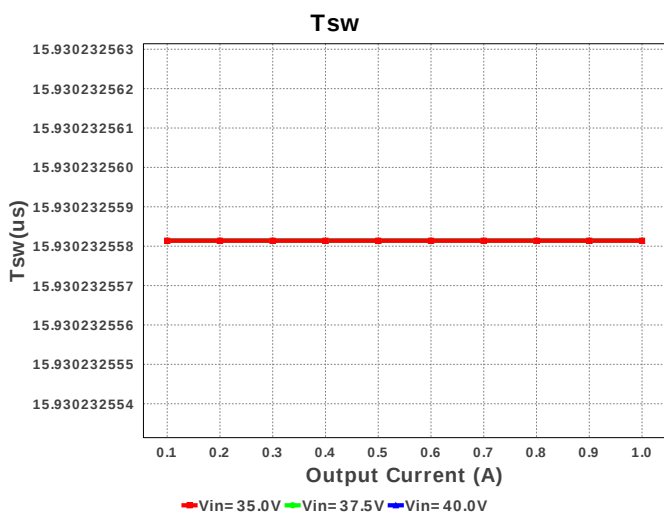
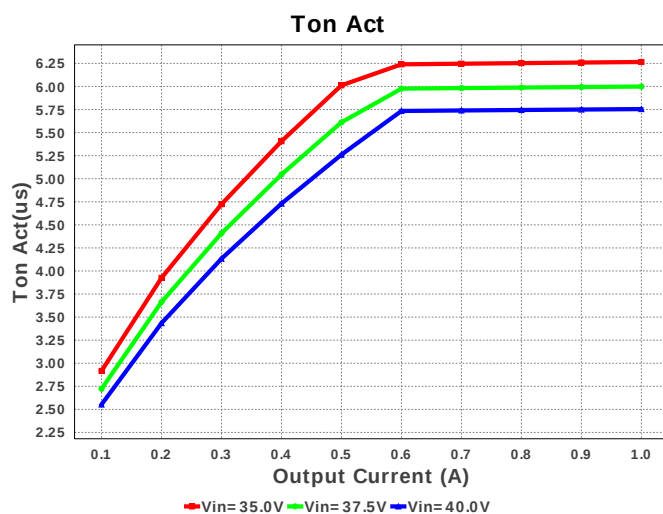
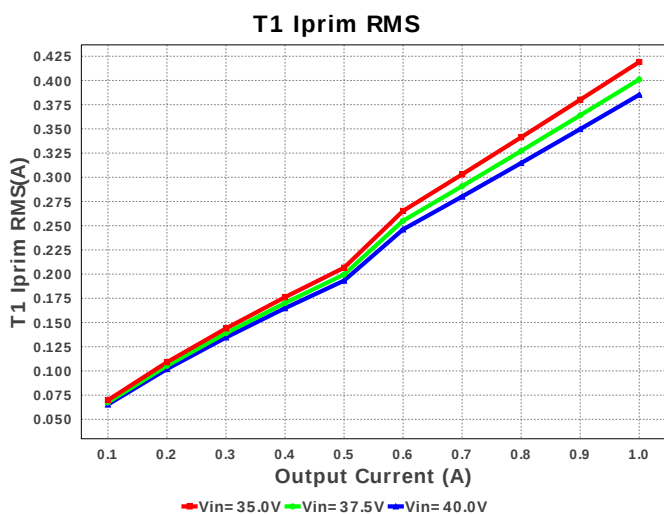
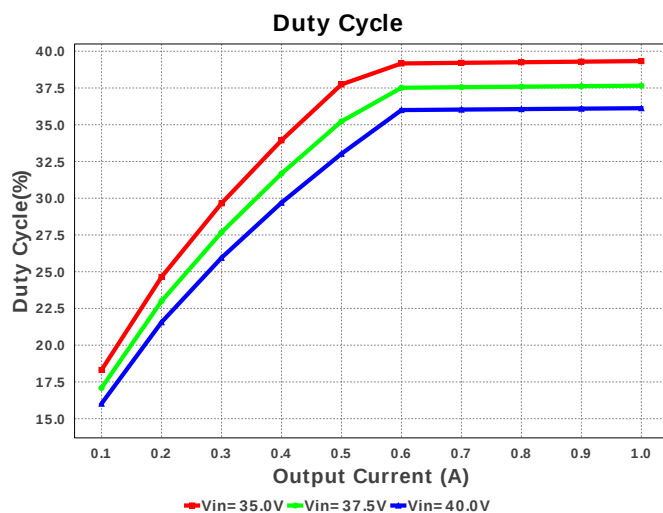
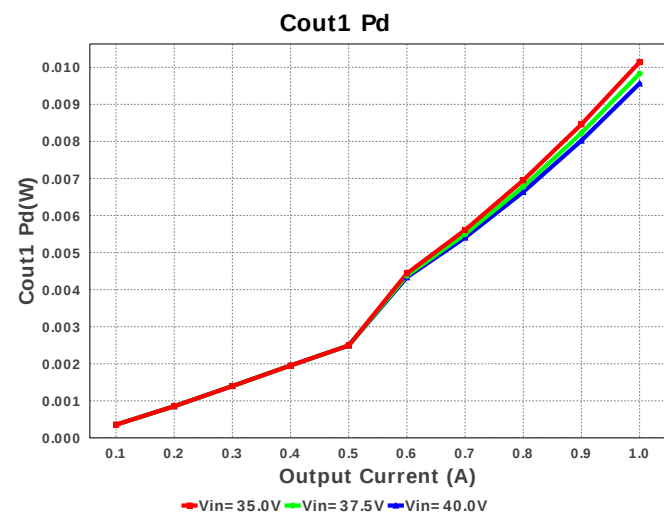
D0008A 57 mm²

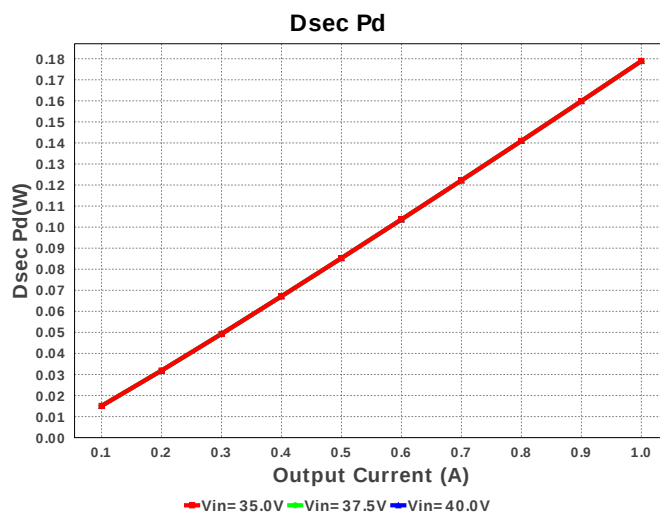
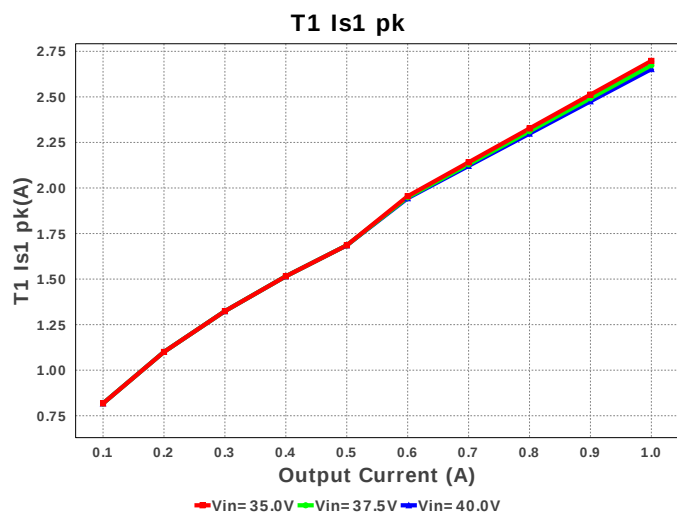
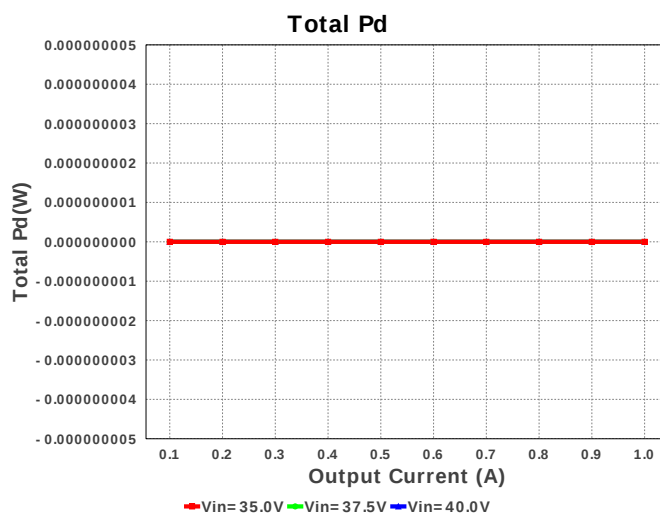
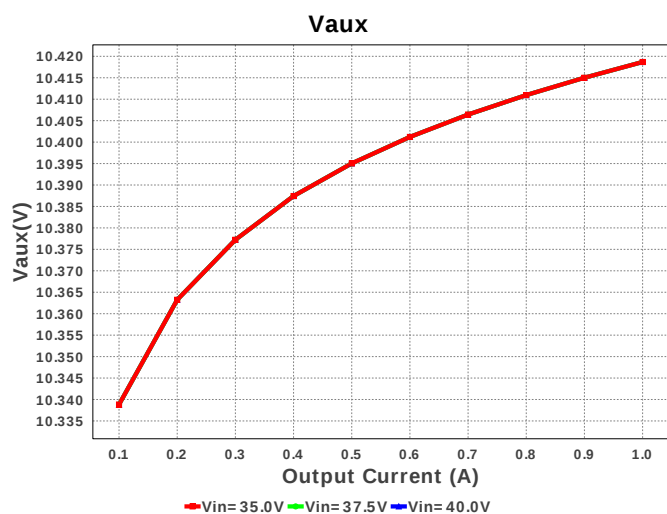
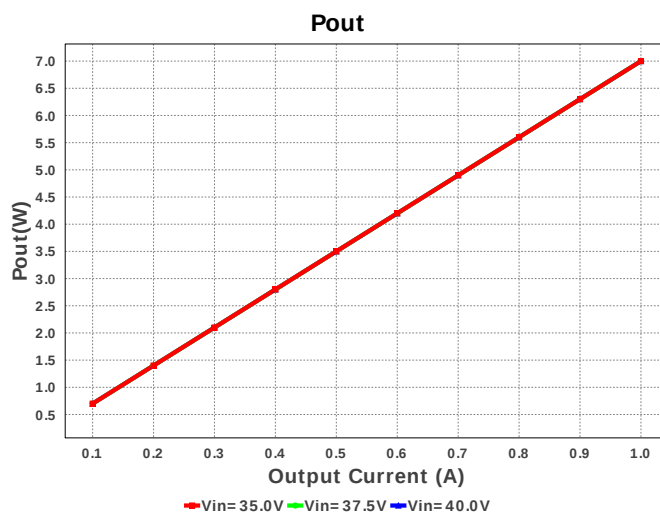
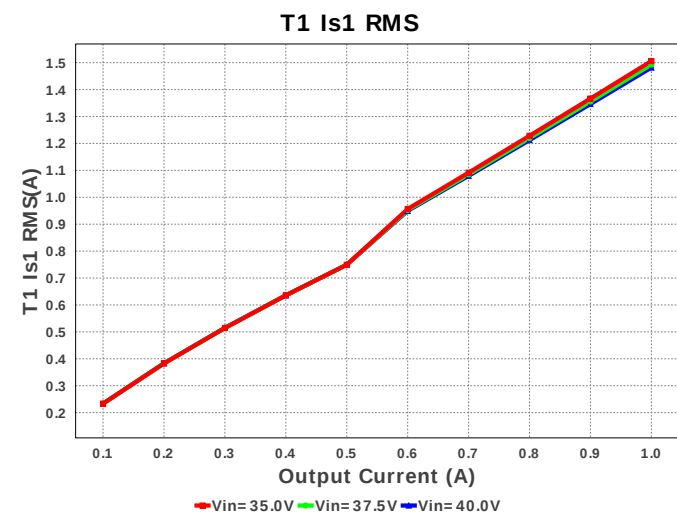
47.	VR	Texas Instruments	TL431AIDBVR	Voltage References	1	\$0.07	
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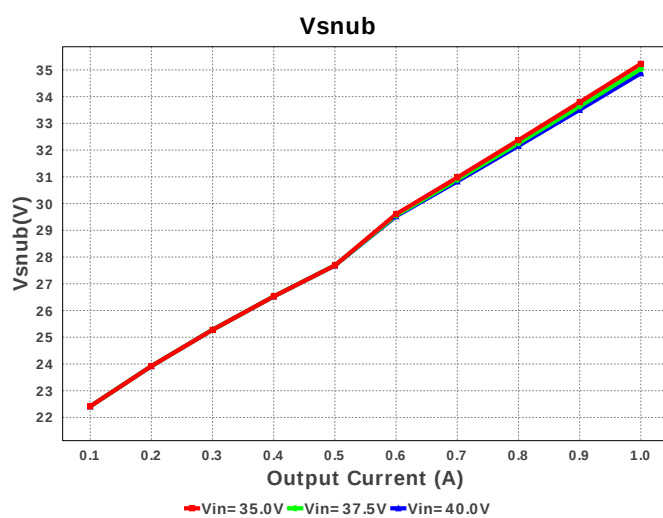
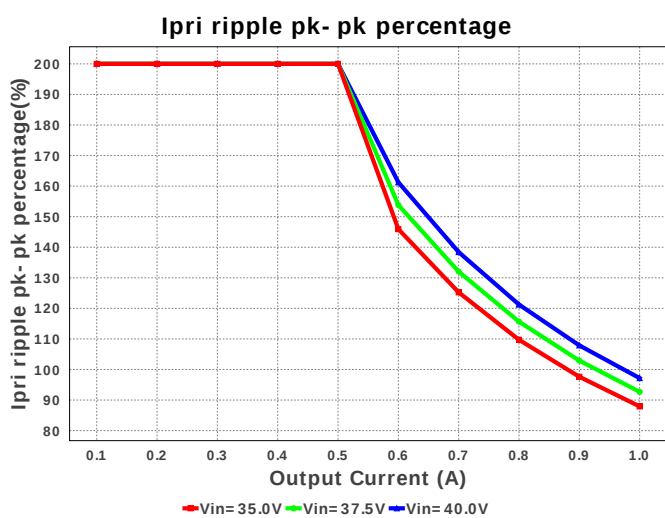
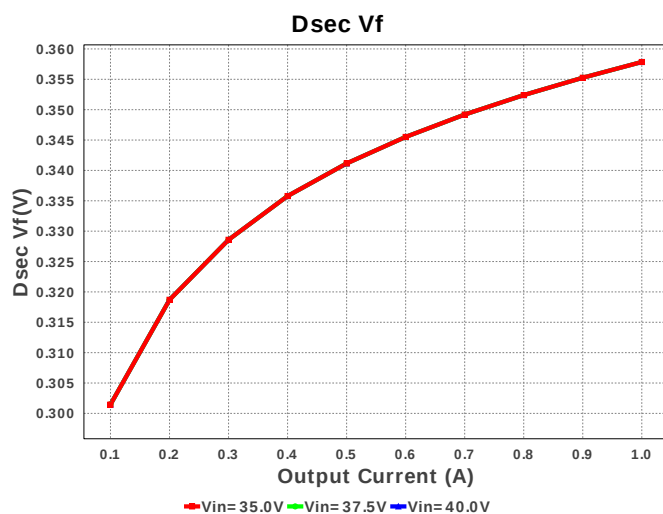
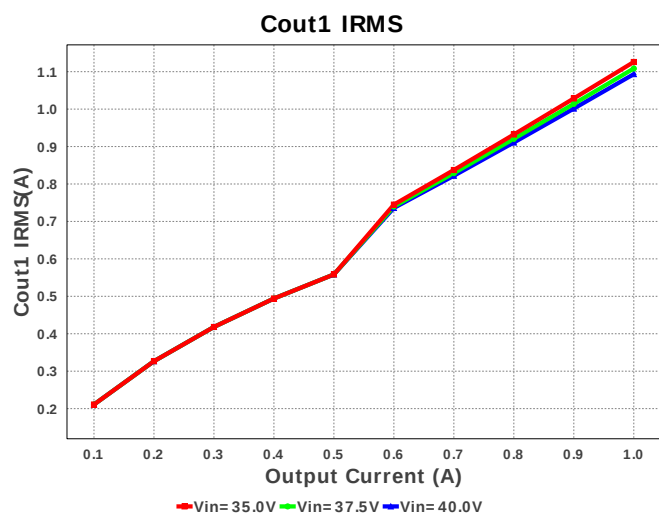
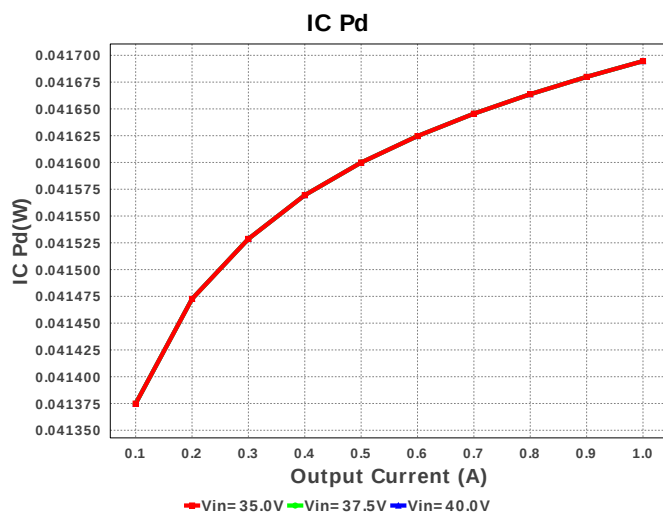
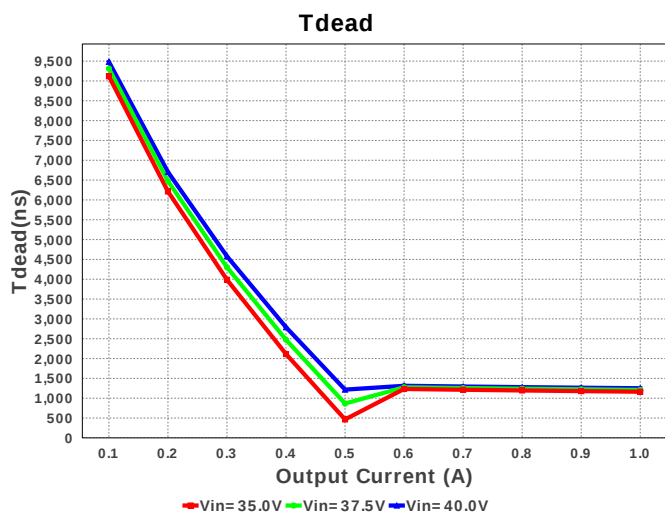
R-PDSO-G3 16 mm²

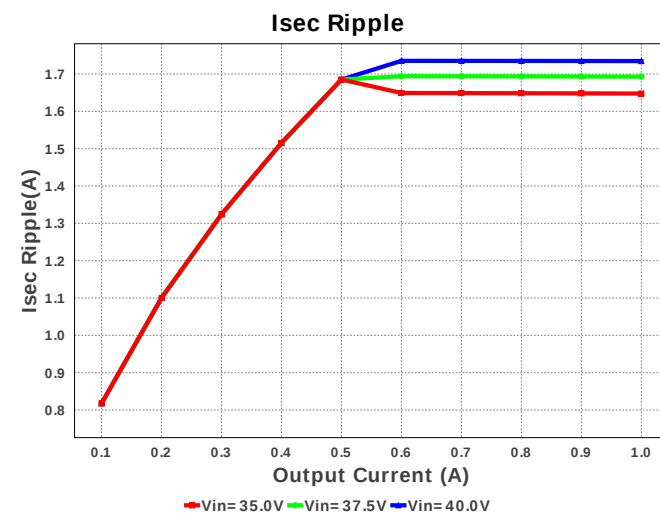
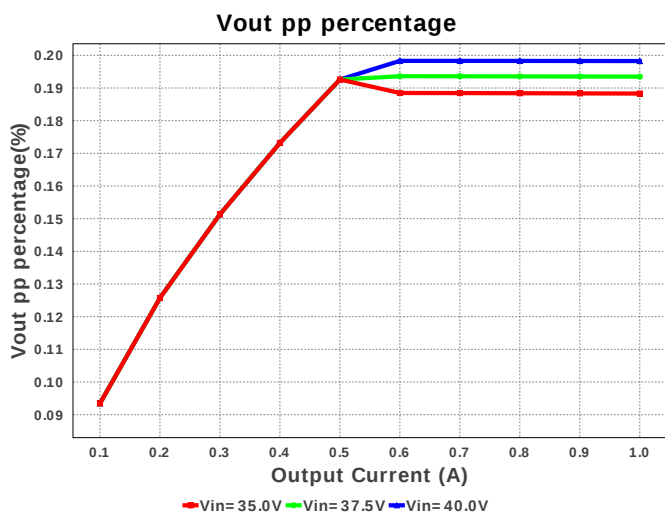
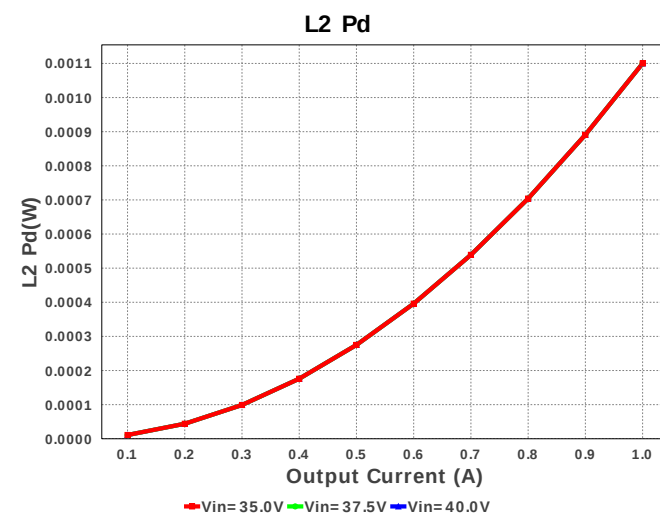
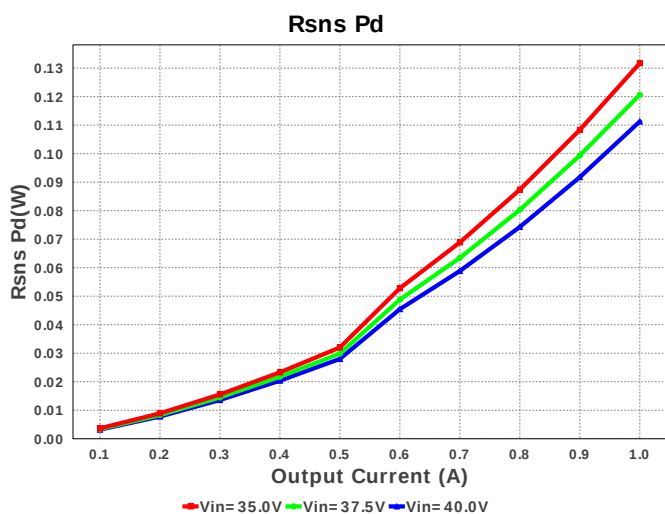
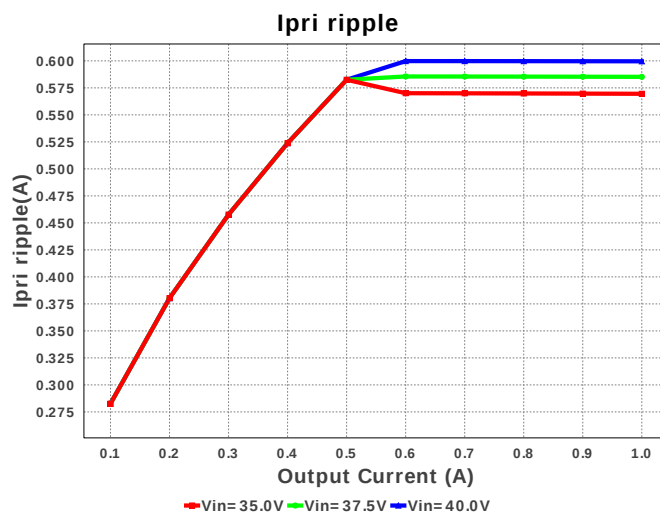
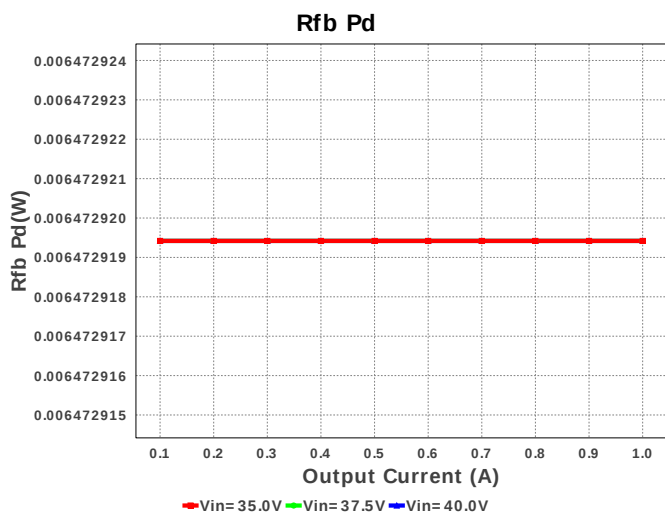


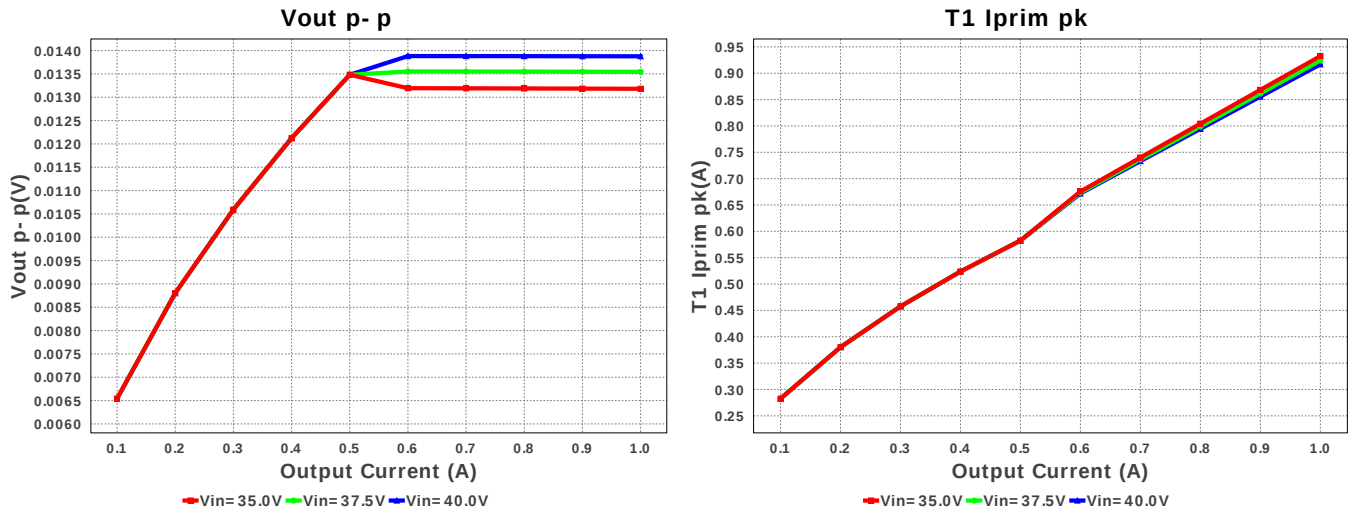












Operating Values

#	Name	Value	Category	Description
1.	Cout1 IRMS	1.126 A	Current	Output capacitor1 RMS ripple current
2.	Iin Avg	222.907 mA	Current	Average input current
3.	Iout_DCM	538.652 mA	Current	Approximate Current below which DCM mode of operation will begin
4.	Ipri Avg	254.742 mA	Current	Average Current in Primary Winding over the complete Switching Period
5.	Ipri ripple	569.517 mA	Current	Ripple Current in the Primary Winding
6.	Ipri ripple pk-pk percentage	87.927 %	Current	Primary Current pk-pk ripple percentage(of Ipri avg during ton only)
7.	Isec Ripple	1.648 A	Current	Ripple Current in the Secondary Winding
8.	T1 Iprim RMS	419.084 mA	Current	Transformer Primary RMS Current
9.	T1 Iprim pk	932.477 mA	Current	Transformer Primary Peak Current
10.	T1 Is1 RMS	1.506 A	Current	Transformer Secondary1 RMS Current
11.	T1 Is1 pk	2.698 A	Current	Transformer Secondary1 Peak Current
12.	BOM Count	47	General	Total Design BOM count
13.	Daux trr	0.0 ns	General	Auxiliary Diode Reverse Recovery Time
14.	Dsec Vf	357.852 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	340.147 mV	General	Effective Forward Voltage Drop at the Operating Current
17.	Dsnub trr	0.0 ns	General	Snubber Diode Reverse Recovery Time
18.	FootPrint	1.409 k mm ²	General	Total Foot Print Area of BOM components
19.	Frequency	62.774 kHz	General	Switching frequency
20.	Pout	7.0 W	General	Total output power
21.	Tdead	1.164 kns	General	Approximate Dead Time of the Regulator
22.	Toff	8.501 us	General	Approximate Converter Off Time
23.	Ton Act	6.265 us	General	Approximate Converter On Time
24.	Total BOM	\$0.0	General	Total BOM Cost
25.	Tsw	15.93 us	General	Switching Time Period
26.	Vaux	10.419 V	General	Auxiliary Voltage
27.	Vsnub	35.225 V	General	Voltage Across the Snubber
28.	Vout Actual	6.995 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
29.	Vout OP	7.0 V	Op_Point	Operational Output Voltage
30.	Duty Cycle	39.329 %	Op_point	Duty cycle
31.	Efficiency	89.724 %	Op_point	Steady state efficiency
32.	IC Tj	32.085 degC	Op_point	IC junction temperature
33.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
34.	IOUT_OP	1.0 A	Op_point	Iout operating point
35.	M1 TJOP	30.255 degC	Op_point	M1 MOSFET junction temperature
36.	Vout p-p	13.181 mV	Op_point	Peak-to-peak output ripple voltage
37.	Cin Pd	359.347 μW	Power	Input capacitor power dissipation
38.	Cout1 Pd	10.141 mW	Power	Output capacitor1 power dissipation
39.	Dsec Pd	178.926 mW	Power	Secondary Diode Power Dissipation
40.	Dsec2 Pd	170.073 mW	Power	Secondary Diode Power Dissipation
41.	IC Pd	41.695 mW	Power	IC power dissipation
42.	L2 Pd	1.1 mW	Power	Average Power Dissipation in the Inductor Over the AC Line Period
43.	M1 Pd	4.639 mW	Power	M1 MOSFET total power dissipation
44.	Paux	1.553 mW	Power	Power Dissipation in Raux and Daux
45.	Pd Rstartup	33.092 mW	Power	Power Dissipation in Rstartup1 and Rstartup2
46.	Rdrv Pd	5.276 μW	Power	Power Dissipation in Gate Drive Resistor
47.	Rfb Pd	6.473 mW	Power	Rfb Power Dissipation
48.	Rsns Pd	131.724 mW	Power	Current Limit Sense Resistor Power Dissipation
49.	Snubber Pd	118.002 mW	Power	Snubber Power Dissipation
50.	T1 Pd	344.602 mW	Power	Estimated Losses in Transformer

#	Name	Value	Category	Description
51.	Total Pd	0.0 W	Power	Total Power Dissipation
52.	Vout Tolerance	1.624 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
53.	Vout pp percentage	188.299 m%		Output Voltage ripple percentage

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	40.0	Maximum input voltage
3.	VinMin	35.0	Minimum input voltage
4.	Vout	7.0	Output Voltage
5.	base_pn	UCC28C41	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. UCC28C41 Product Folder : <http://www.ti.com/product/UCC28C41> : contains the data sheet and other resources.

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