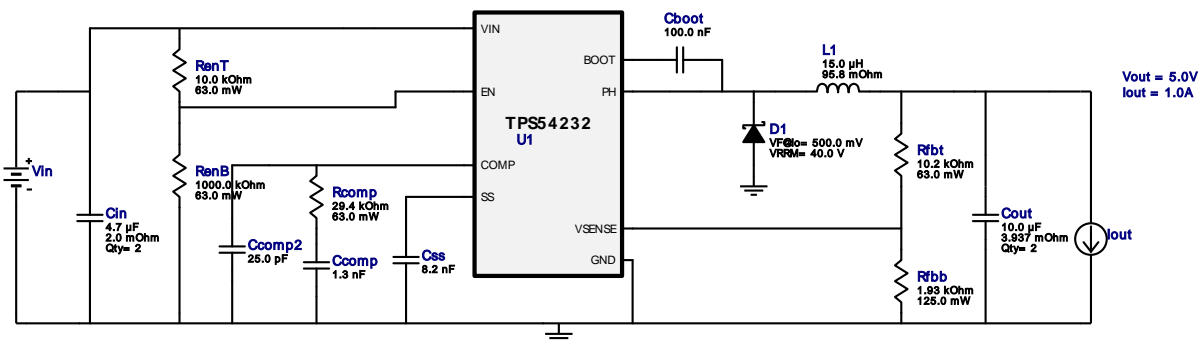




WEBENCH® Design Report

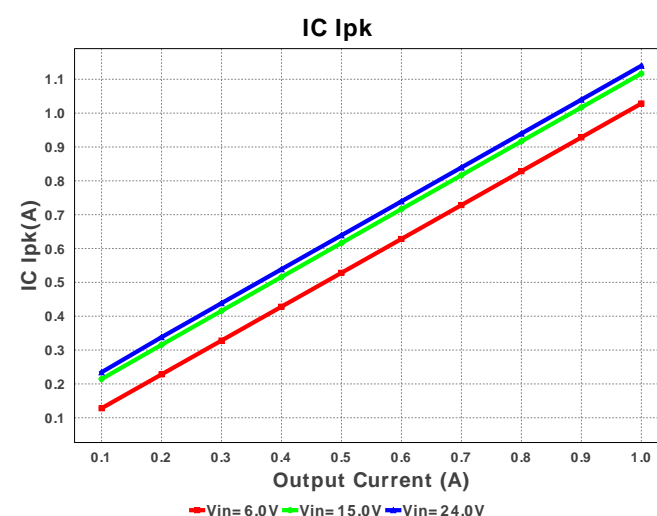
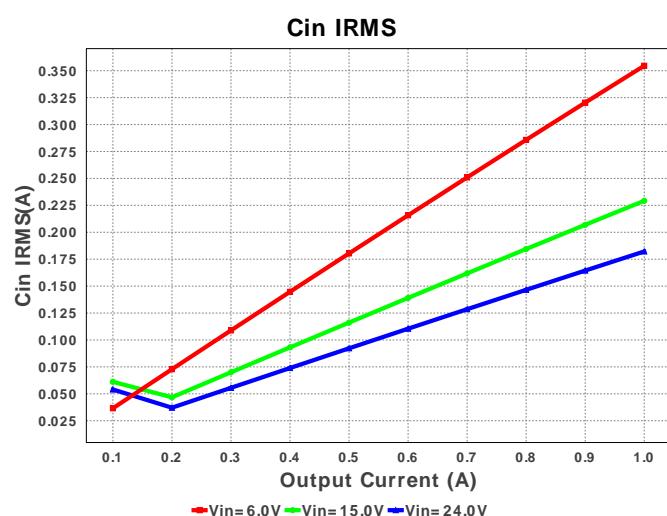
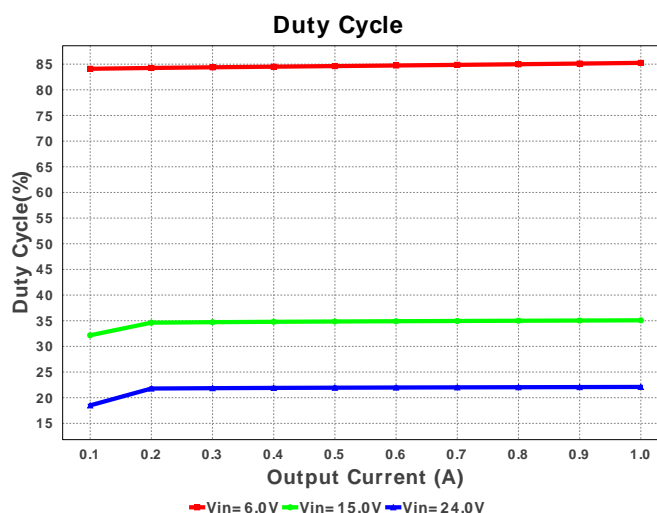
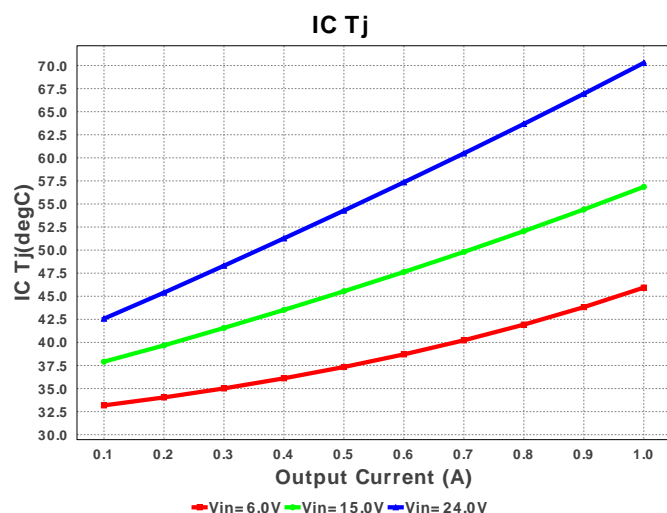
Design : 4181735/3 TPS54232DR
TPS54232DR 6.0V-24.0V to 5.00V @ 1.0A

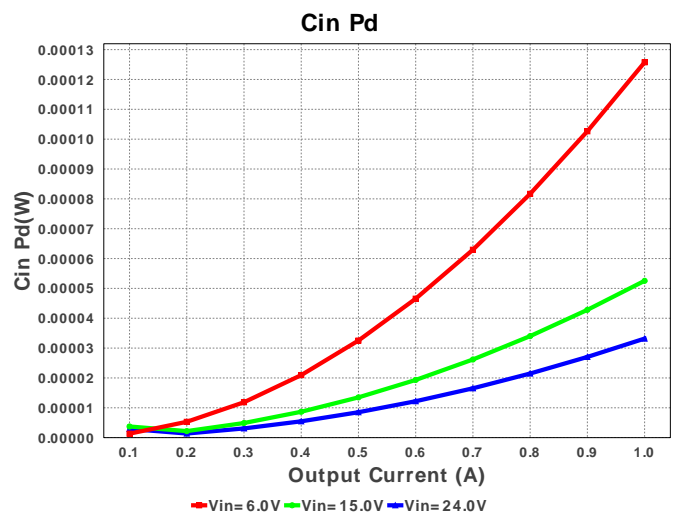
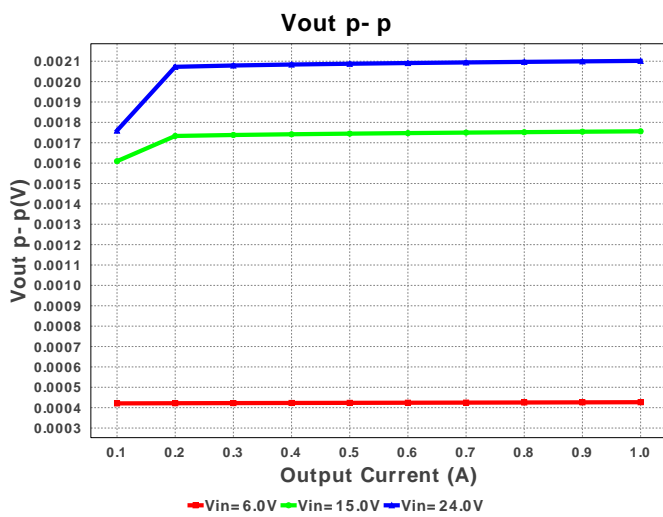
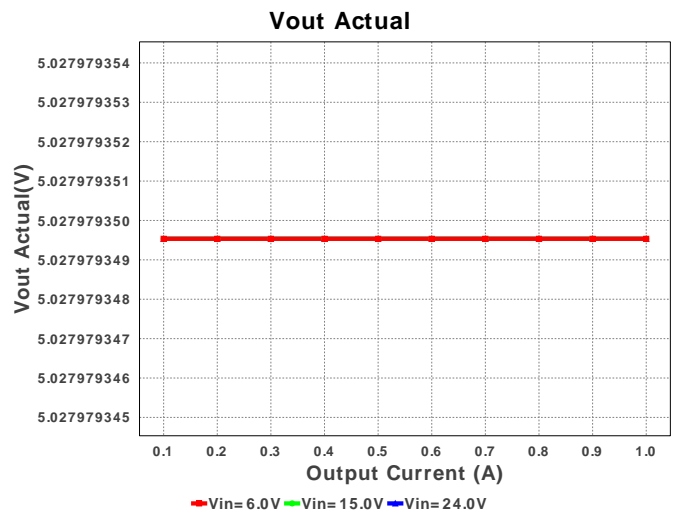
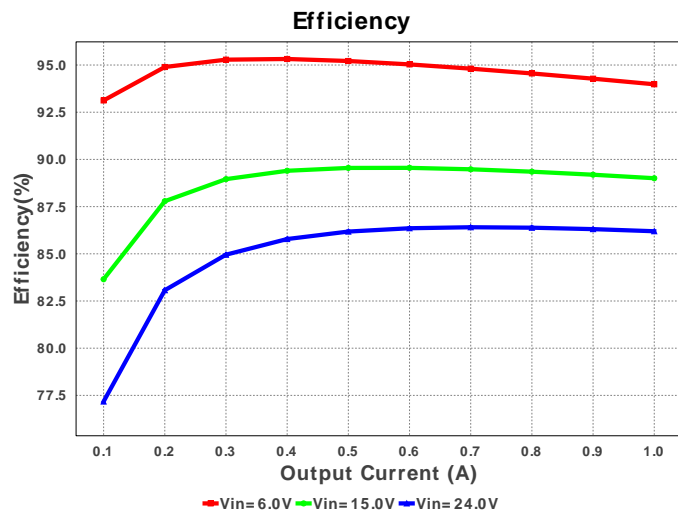
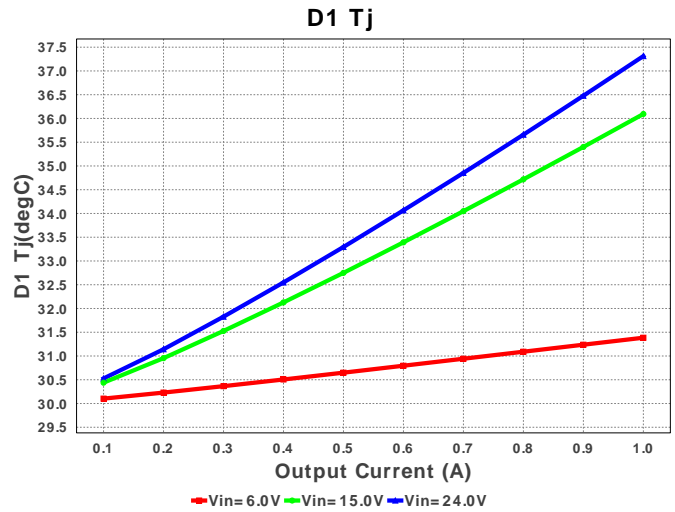
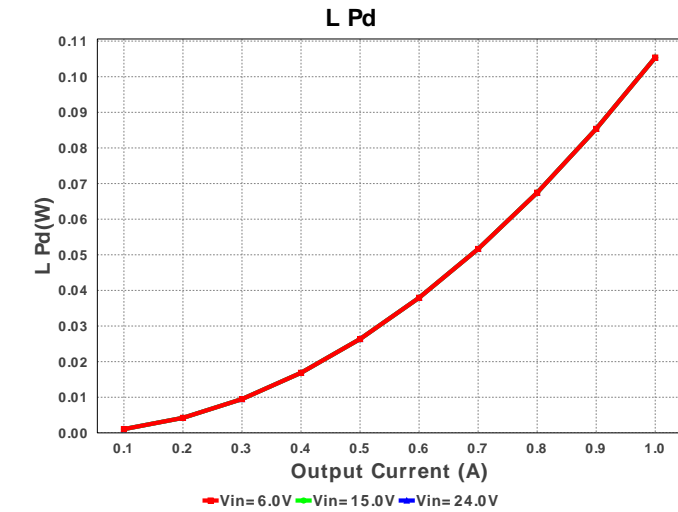


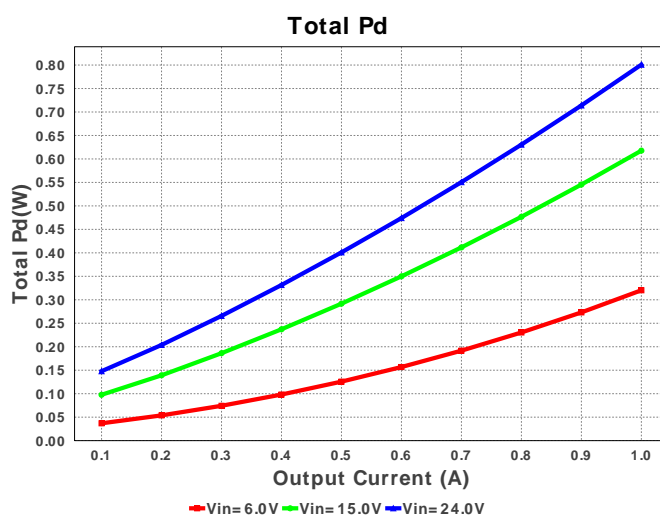
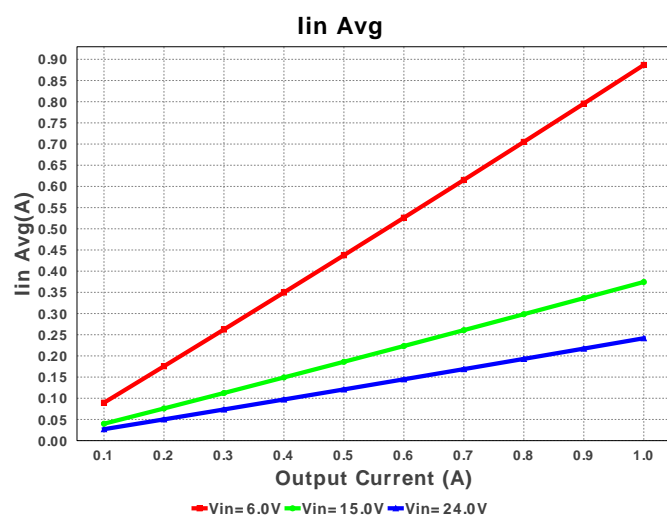
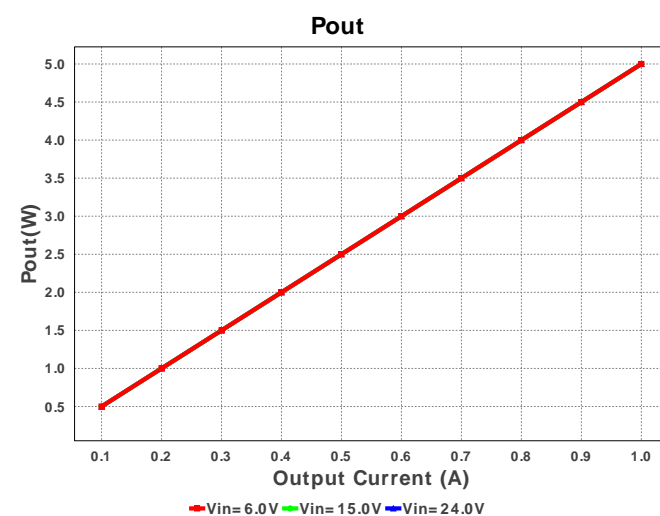
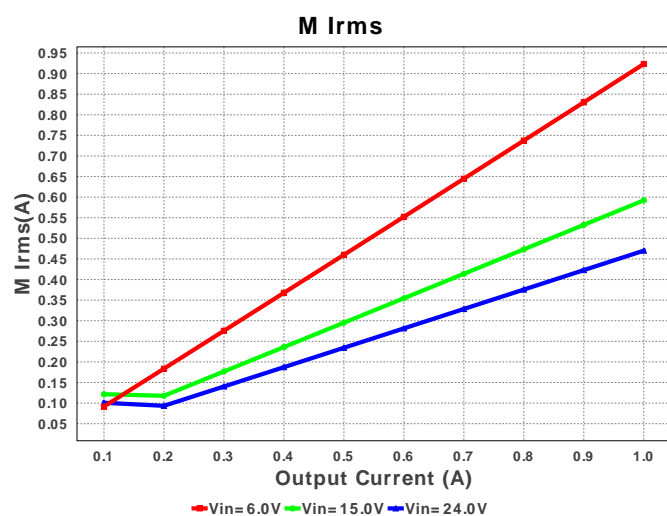
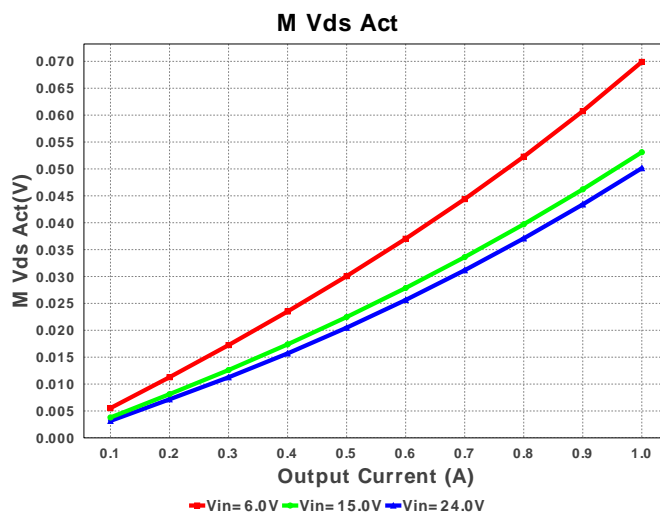
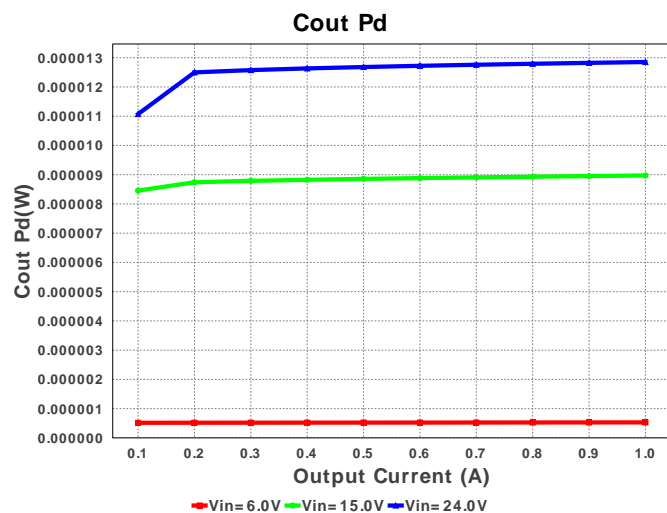
Electrical BOM

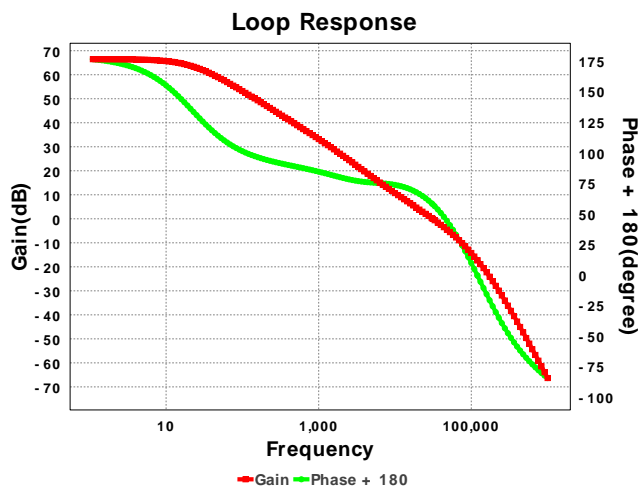
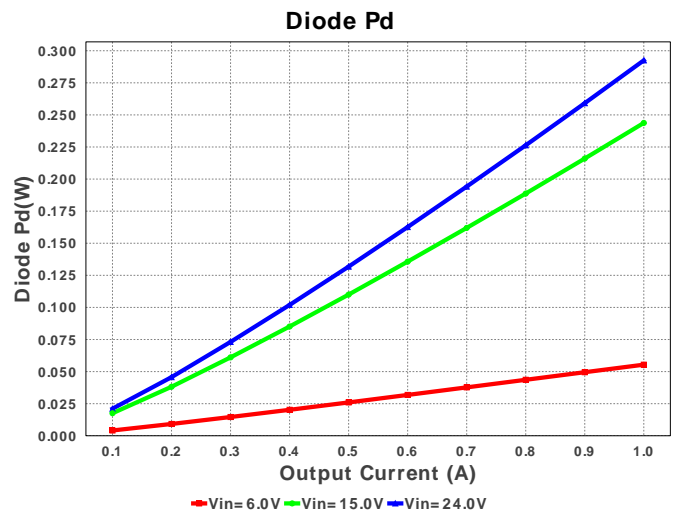
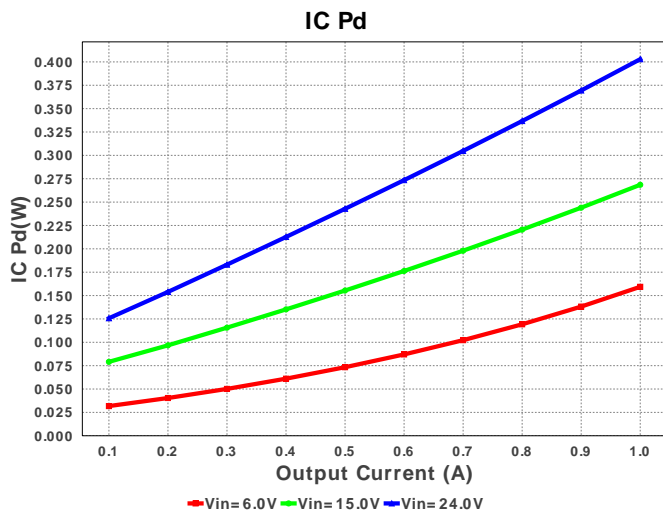
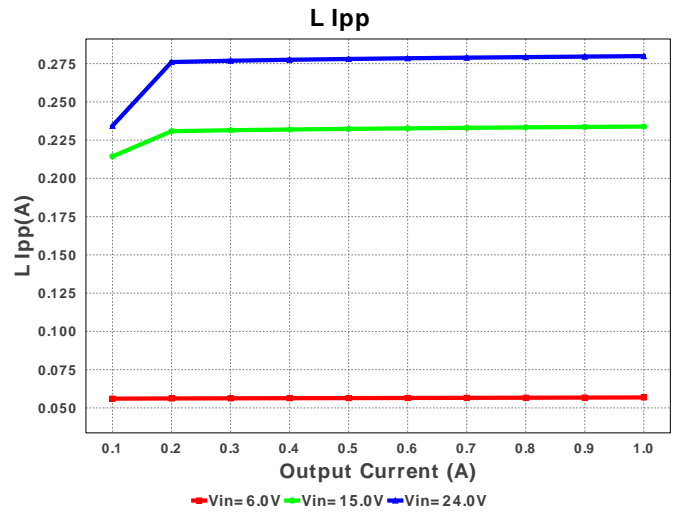
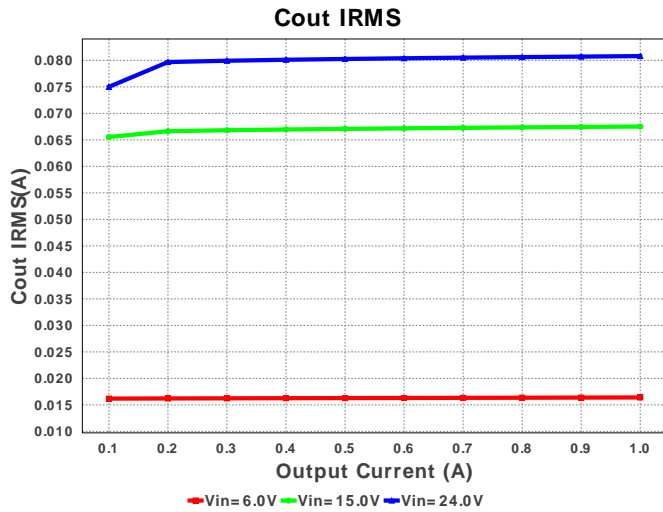
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	Ccomp	MuRata	GRM2165C2A132JA01D Series= C0G/NP0	Cap= 1.3 nF VDC= 100.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
3.	Ccomp2	Samsung Electro-Mechanics	CL21C250JBANNNC Series= C0G/NP0	Cap= 25.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
4.	Cin	MuRata	GRM32ER71H475KA88L Series= X7R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 50.0 V IRMS= 5.35 A	2	\$0.19	1210 15 mm ²
5.	Cout	MuRata	GRM219R61A106KE44D Series= X5R	Cap= 10.0 uF ESR= 3.937 mOhm VDC= 10.0 V IRMS= 2.7713 A	2	\$0.03	0805 7 mm ²
6.	Css	MuRata	GRM033R61A822KA01D Series= X5R	Cap= 8.2 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
7.	D1	Diodes Inc.	B240A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.09	SMA 37 mm ²
8.	L1	Bourns	SRN6045-150M	L= 15.0 uH DCR= 95.8 mOhm	1	\$0.16	SRN6045 64 mm ²
9.	Rcomp	Vishay-Dale	CRCW040229K4FKED Series= CRCW..e3	Res= 29.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
10.	RenB	Vishay-Dale	CRCW04021M00FKED Series= CRCW..e3	Res= 1000.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
11.	RenT	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rfbb	Yageo America	RT0805BRD071K93L Series= RT0805	Res= 1.93 kOhm Power= 125.0 mW Tolerance= 0.1%	1	\$0.05	 0805 7 mm ²
13.	Rfbt	Vishay-Dale	CRCW040210K2FKED Series= CRCW...e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
14.	U1	Texas Instruments	TPS54232DR	Switcher	1	\$0.55	

D0008A 57 mm²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	182.166 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	80.803 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.14 A	Current	Peak switch current in IC
4.	Iin Avg	241.7 mA	Current	Average input current
5.	L Ipp	279.91 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	470.088 mA	Current	Q lavg
7.	BOM Count	16	General	Total Design BOM count
8.	FootPrint	238.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	1000.0 kHz	General	Switching frequency
10.	M Vds Act	50.135 mV	General	Voltage drop across the MosFET
11.	Mode	CCM	General	Conduction Mode

#	Name	Value	Category	Description
12.	Pout	5.0 W	General	Total output power
13.	Total BOM	\$1.39	General	Total BOM Cost
14.	D1 Tj	37.312 degC	Op_Point	D1 junction temperature
15.	Low Freq Gain	66.466 dB	Op_Point	Gain at 10Hz
16.	Vout Actual	5.028 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
18.	Cross Freq	31.145 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	22.098 %	Op_point	Duty cycle
20.	Efficiency	86.195 %	Op_point	Steady state efficiency
21.	Gain Marg	-17.301 dB	Op_point	Bode Plot Gain Margin
22.	IC Tj	70.289 degC	Op_point	IC junction temperature
23.	ICThetaJA	100.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	1.0 A	Op_point	Iout operating point
25.	Phase Marg	58.454 deg	Op_point	Bode Plot Phase Margin
26.	VIN_OP	24.0 V	Op_point	Vin operating point
27.	Vout p-p	2.102 mV	Op_point	Peak-to-peak output ripple voltage
28.	Cin Pd	33.185 µW	Power	Input capacitor power dissipation
29.	Cout Pd	12.853 µW	Power	Output capacitor power dissipation
30.	Diode Pd	292.498 mW	Power	Diode power dissipation
31.	IC Pd	402.888 mW	Power	IC power dissipation
32.	L Pd	105.38 mW	Power	Inductor power dissipation
33.	Total Pd	800.8 mW	Power	Total Power Dissipation
34.	Vout Tolerance	4.458 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	24.0	Maximum input voltage
3.	VinMin	6.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS54232	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54232** Product Folder : <http://www.ti.com/product/TPS54232> : contains the data sheet and other resources.

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