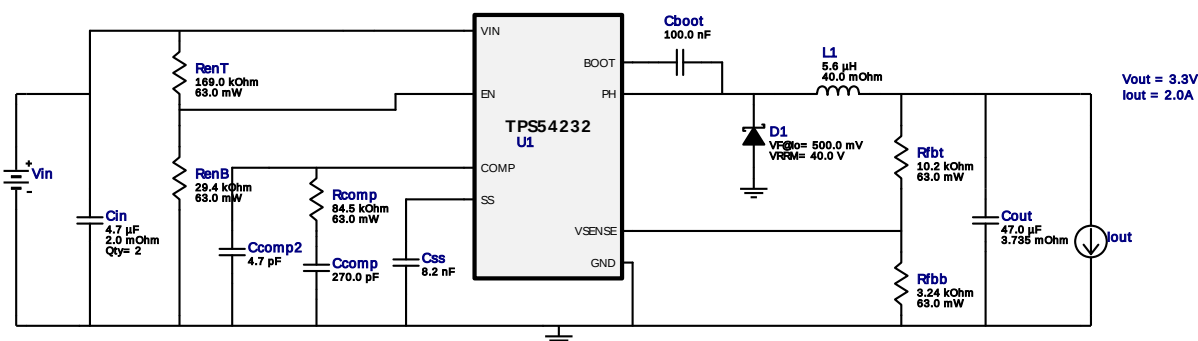


WEBENCH[®] Design Report

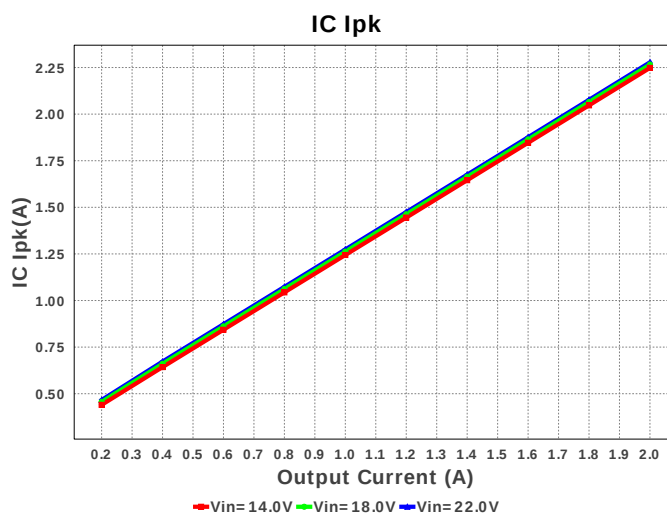
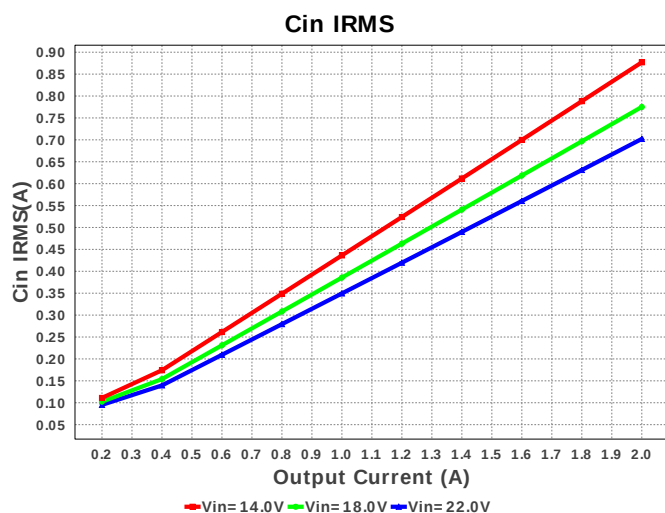
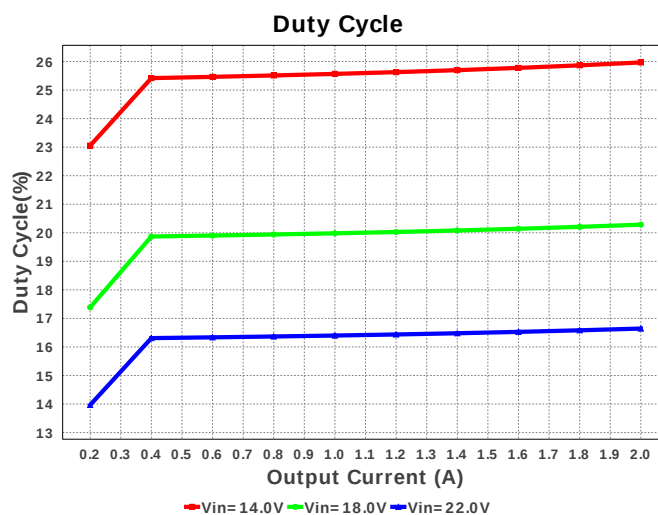
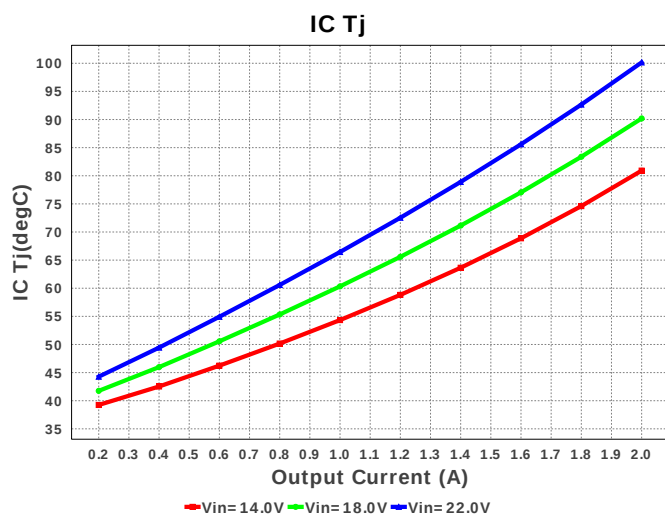
Design : 4737567/20 TPS54232DR
TPS54232DR 14.0V-22.0V to 3.30V @ 2.0A

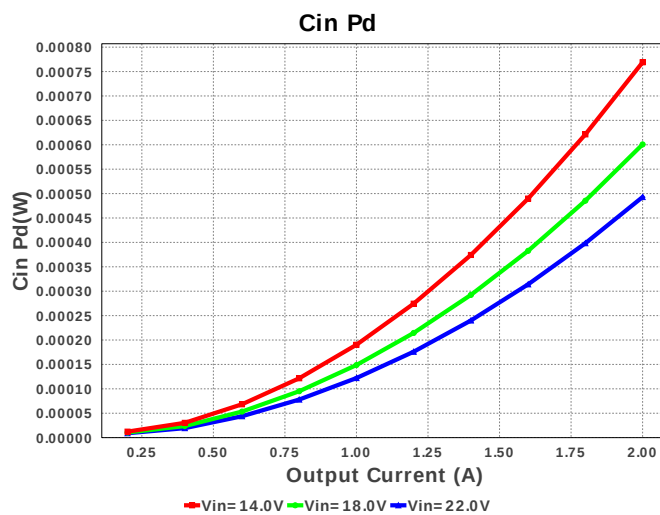
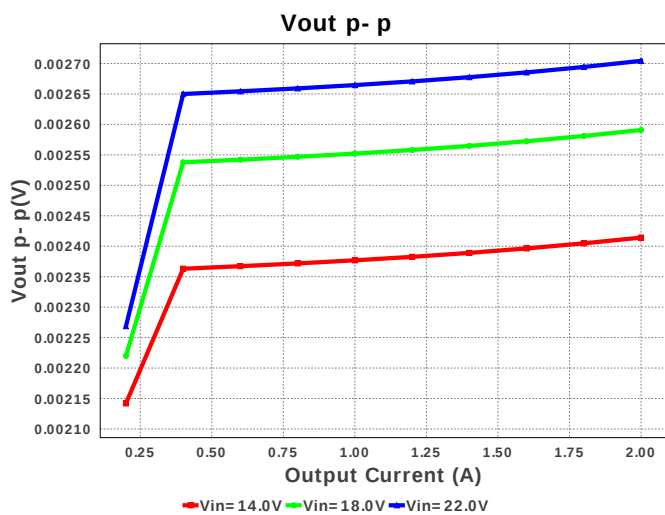
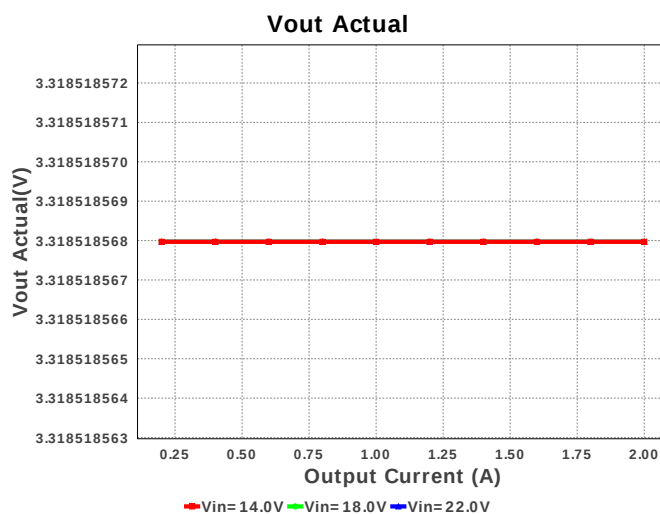
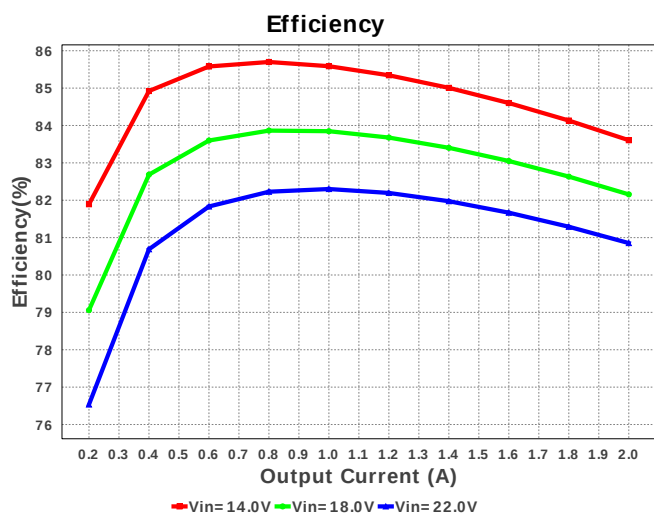
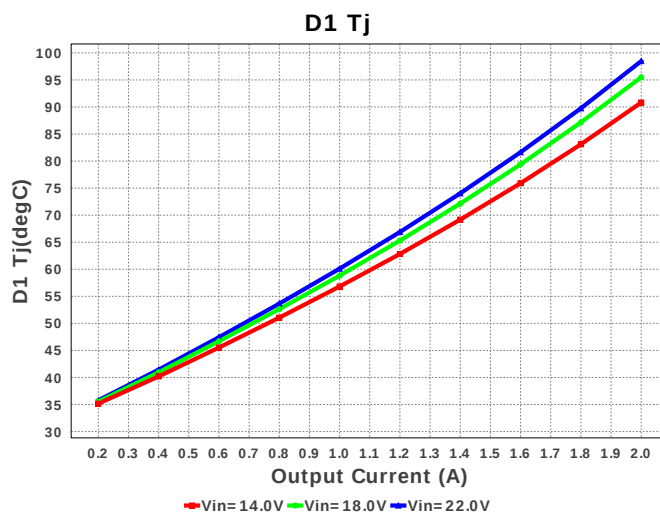
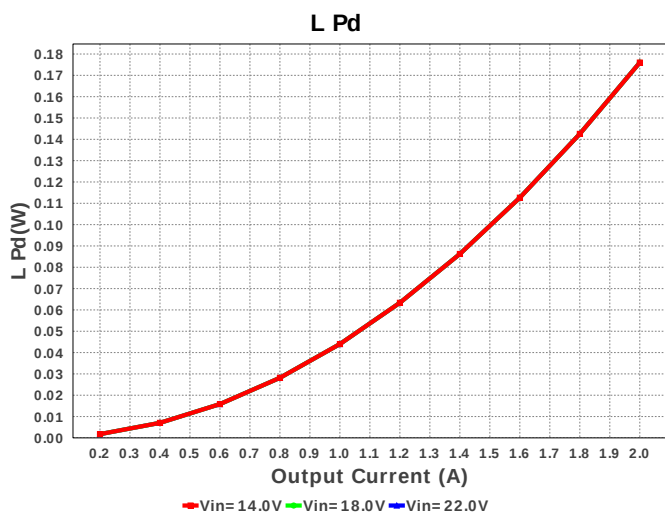


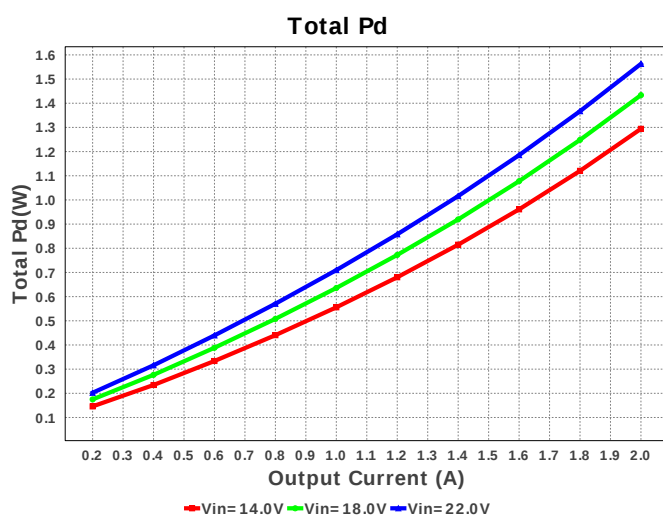
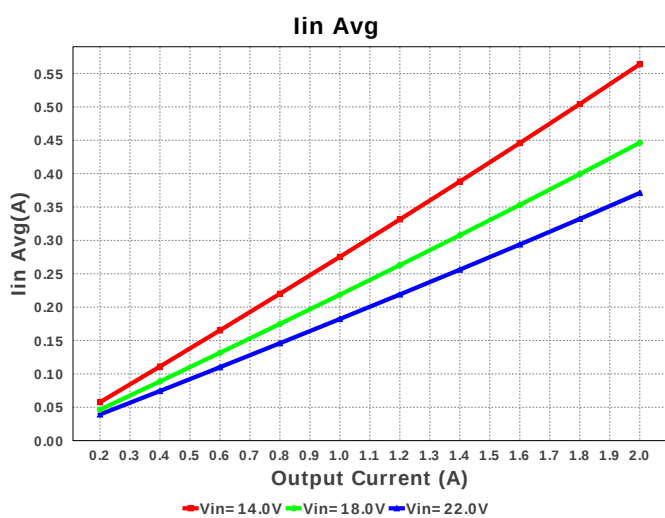
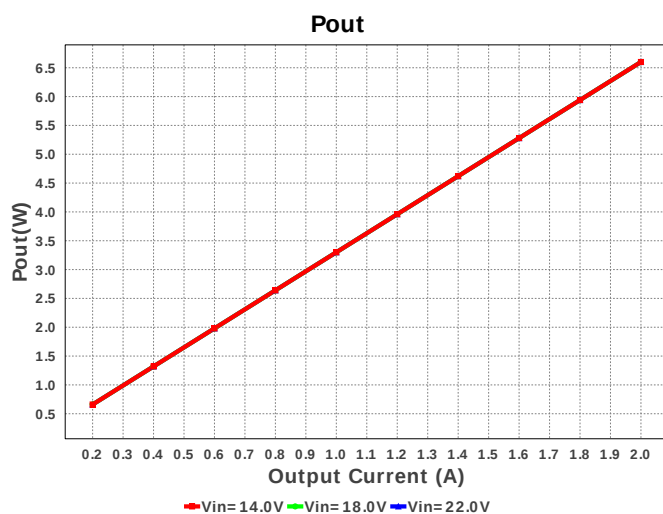
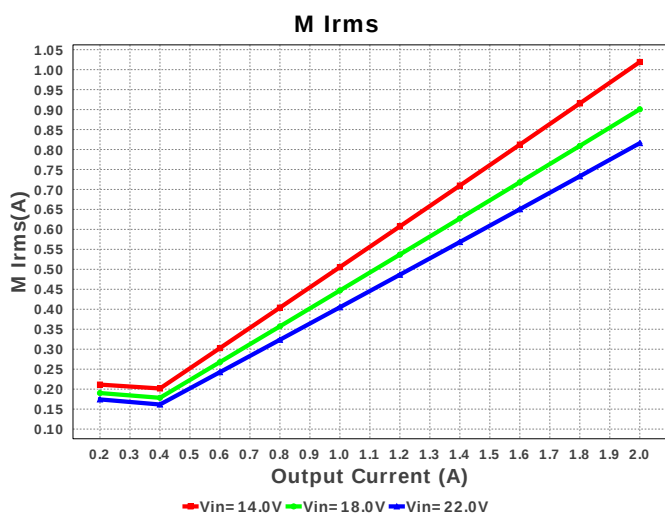
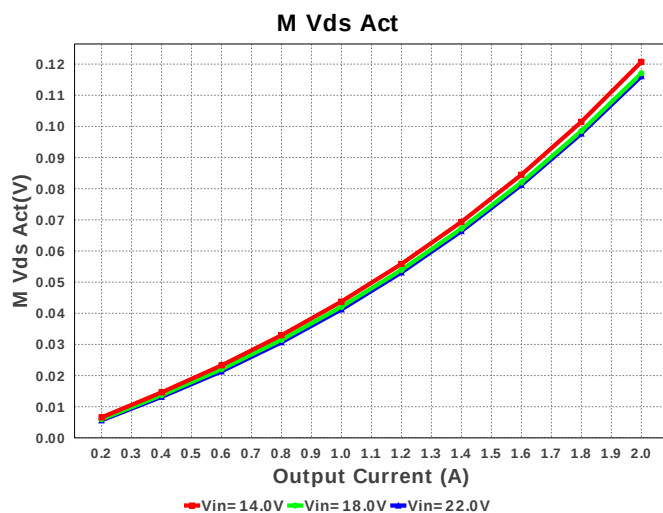
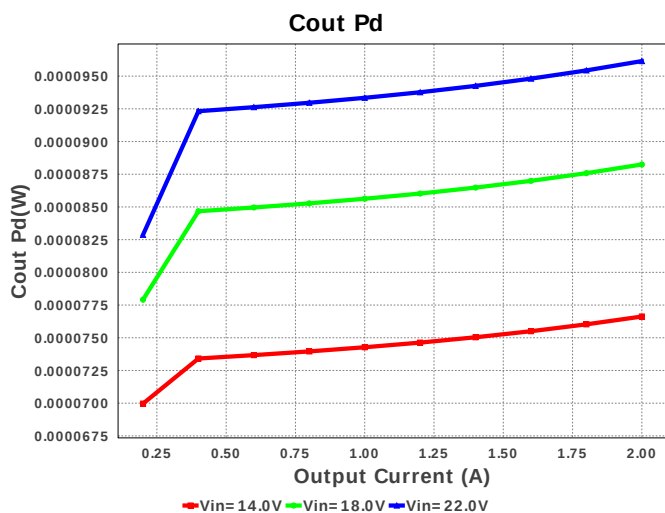
Electrical BOM

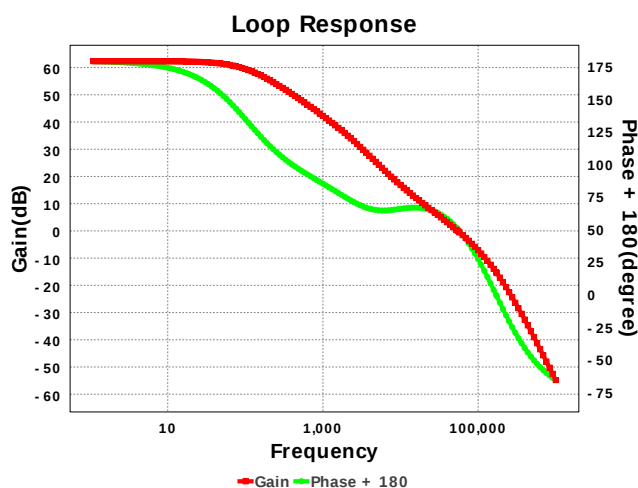
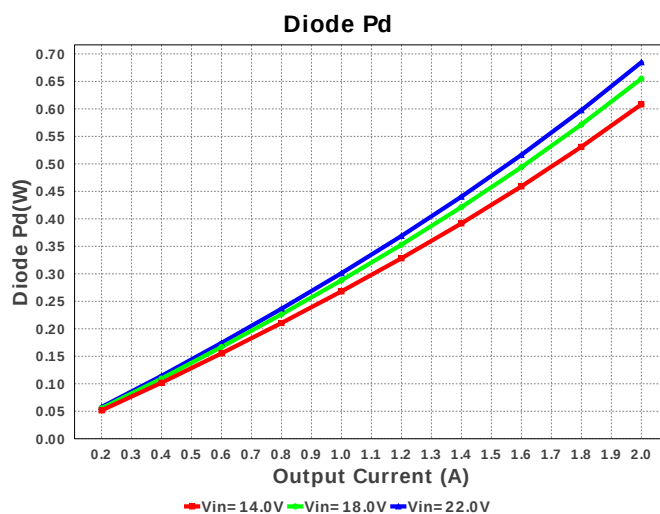
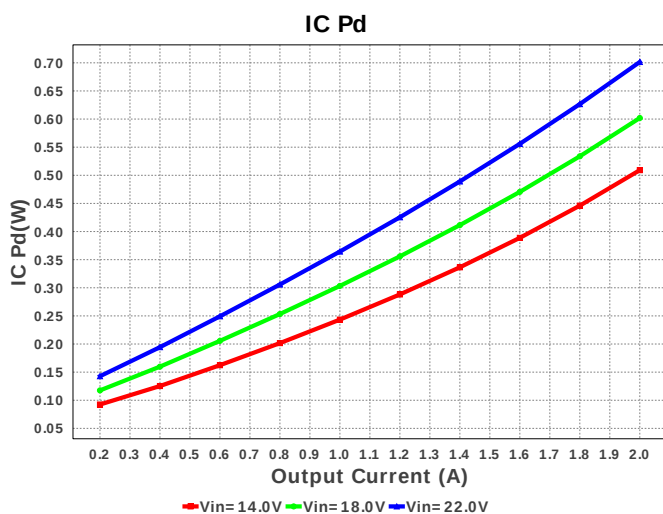
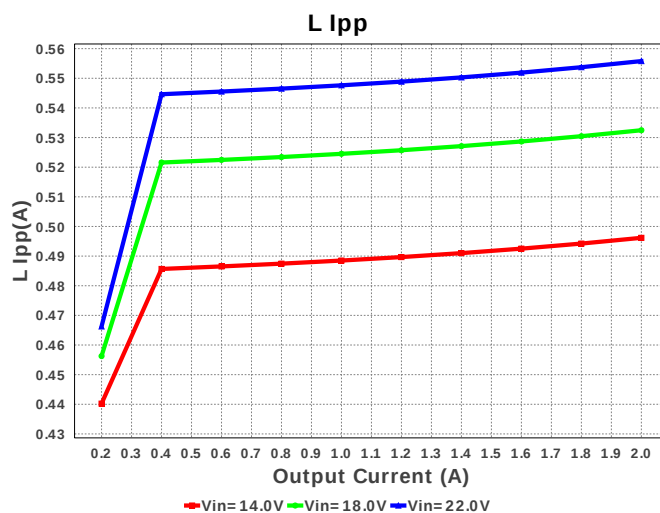
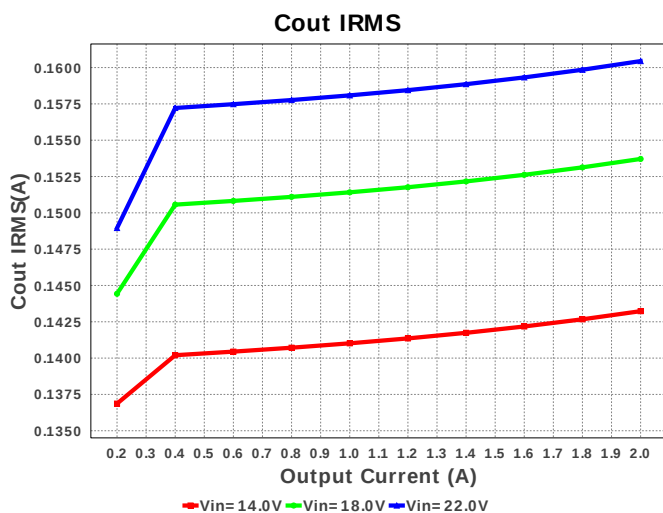
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
2.	Ccomp	Yageo America	CC0805KRX7R9BB271 Series= X7R	Cap= 270.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
3.	Ccomp2	MuRata	GRM1555C1H4R7CA01D Series= C0G/NP0	Cap= 4.7 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 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	GRM31CC80J476KE18L Series= X6S	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.0522 A	1	\$0.10	 1206_190 11 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.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.11	 SMA 37 mm ²
8.	L1	Bourns	SDR0805-5R6ML	L= 5.6 uH DCR= 40.0 mOhm	1	\$0.22	 SDR0805 96 mm ²
9.	Rcomp	Vishay-Dale	CRCW040284K5FKED Series= CRCW..e3	Res= 84.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
10.	RenB	Vishay-Dale	CRCW040229K4FKED Series= CRCW..e3	Res= 29.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	RenT	Vishay-Dale	CRCW0402169KFKED Series= CRCW..e3	Res= 169.0 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	Vishay-Dale	CRCW04023K24FKED Series= CRCW..e3	Res= 3.24 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 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	702.098 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	160.445 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.278 A	Current	Peak switch current in IC
4.	Iin Avg	371.04 mA	Current	Average input current
5.	L Ipp	555.8 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	815.947 mA	Current	MOSFET RMS current
7.	BOM Count	15	General	Total Design BOM count
8.	FootPrint	260.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	1000.0 kHz	General	Switching frequency
10.	M Vds Act	116.099 mV	General	Voltage drop across the MosFET
11.	Pout	6.6 W	General	Total output power

#	Name	Value	Category	Description
12.	Total BOM	\$1.45	General	Total BOM Cost
13.	D1 Tj	98.481 degC	Op_Point	D1 junction temperature
14.	Low Freq Gain	62.345 dB	Op_Point	Gain at 10Hz
15.	Vout Actual	3.319 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
17.	Cross Freq	54.579 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	16.644 %	Op_point	Duty cycle
19.	Efficiency	80.854 %	Op_point	Steady state efficiency
20.	Gain Marg	-15.209 dB	Op_point	Bode Plot Gain Margin
21.	IC Tj	100.149 degC	Op_point	IC junction temperature
22.	ICThetaJA	100.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	2.0 A	Op_point	Iout operating point
24.	Phase Marg	50.673 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	22.0 V	Op_point	Vin operating point
26.	Vout p-p	2.704 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	492.941 µW	Power	Input capacitor power dissipation
28.	Cout Pd	96.149 µW	Power	Output capacitor power dissipation
29.	Diode Pd	684.811 mW	Power	Diode power dissipation
30.	IC Pd	701.493 mW	Power	IC power dissipation
31.	L Pd	176.0 mW	Power	Inductor power dissipation
32.	Total Pd	1.563 W	Power	Total Power Dissipation
33.	Vout Tolerance	5.087 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS54232	Texas Instruments Base Part 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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