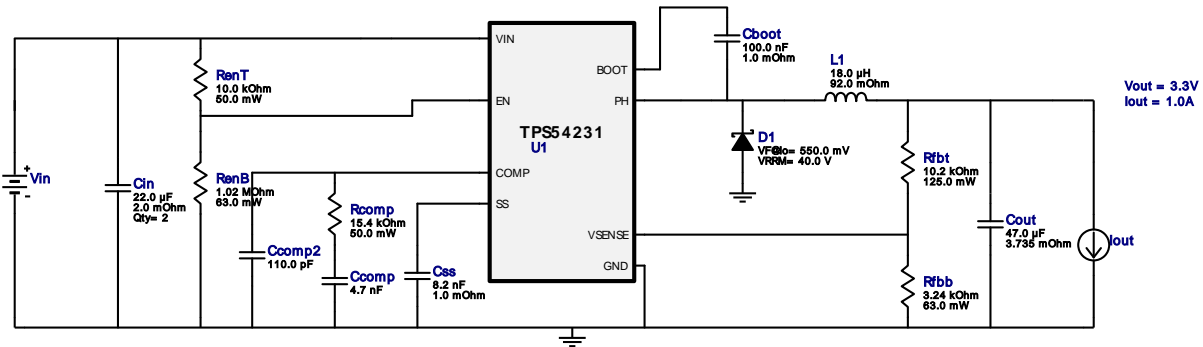




## WEBENCH® Design Report

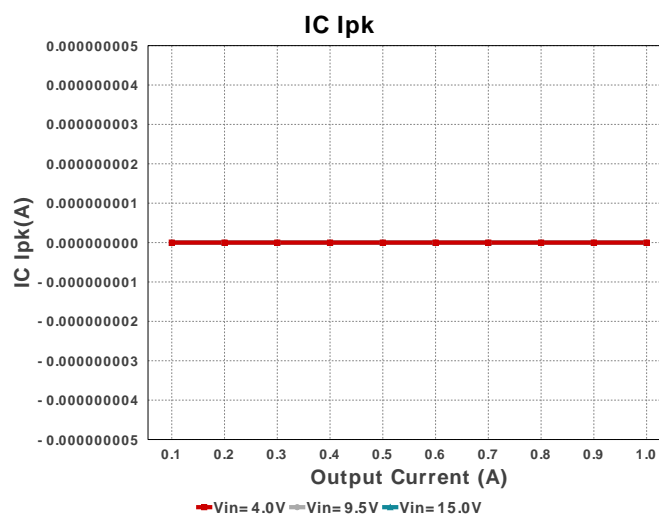
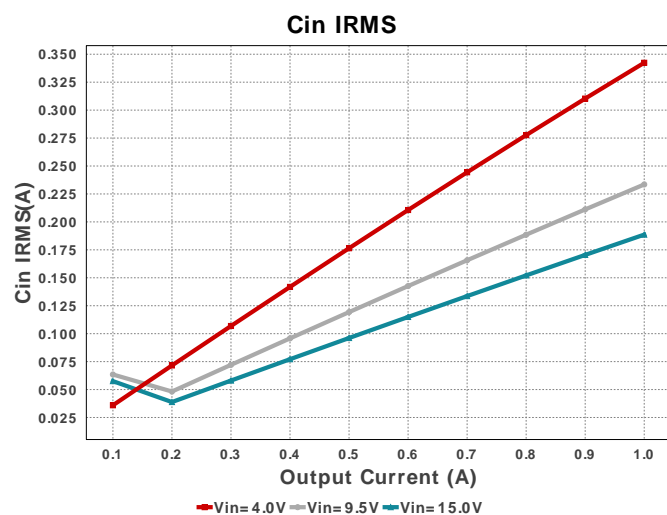
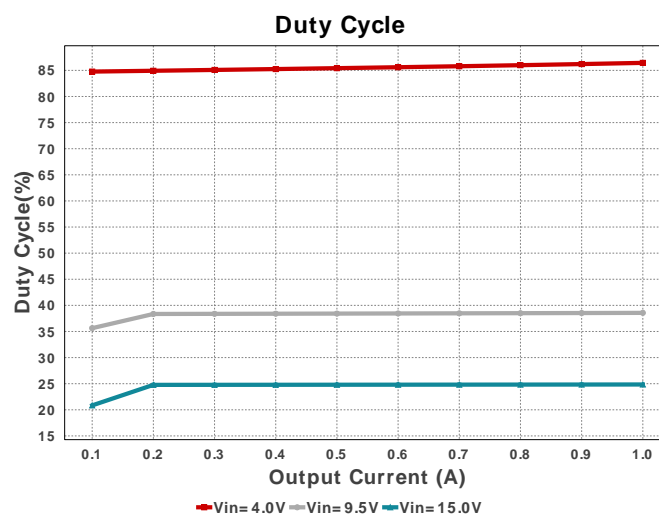
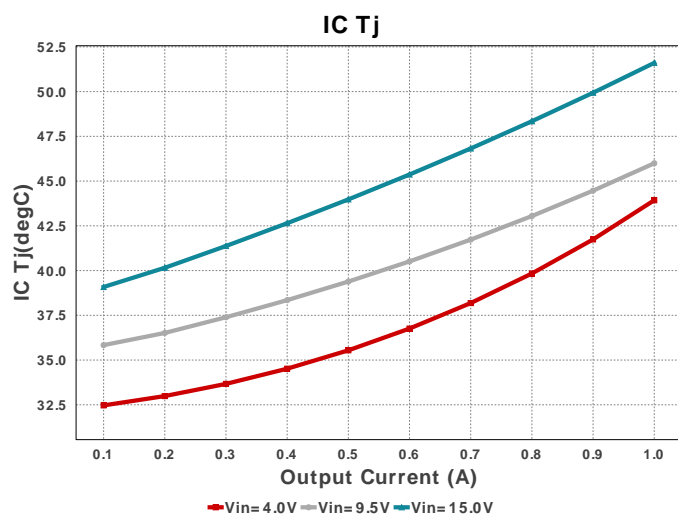
Design : 5277852/44 TPS54231DR  
TPS54231DR 4.0V-15.0V to 3.30V @ 1.0A

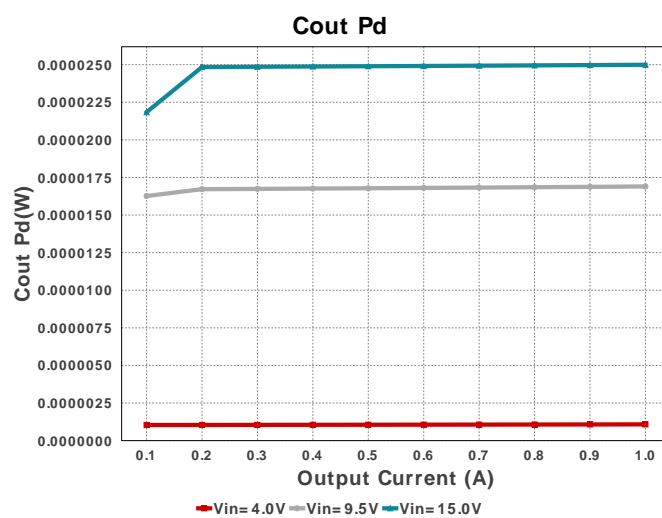
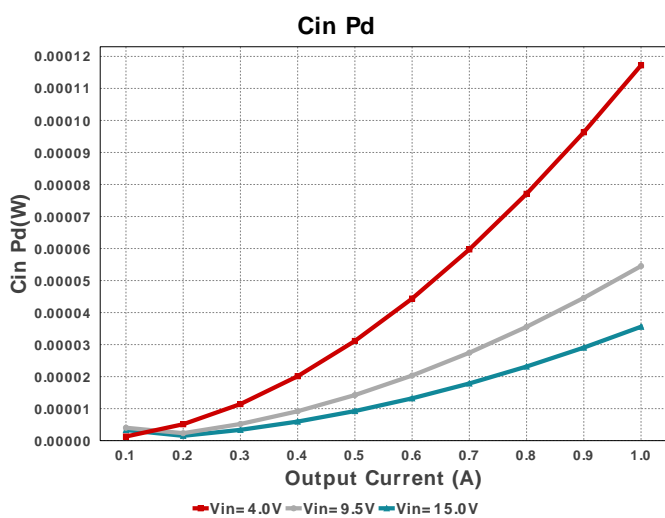
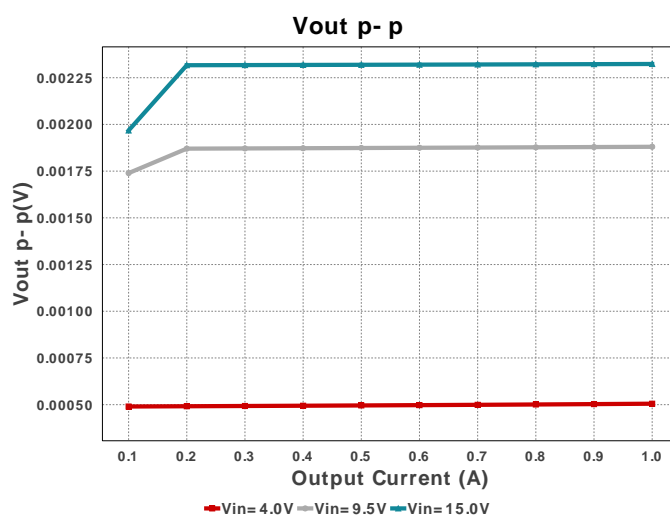
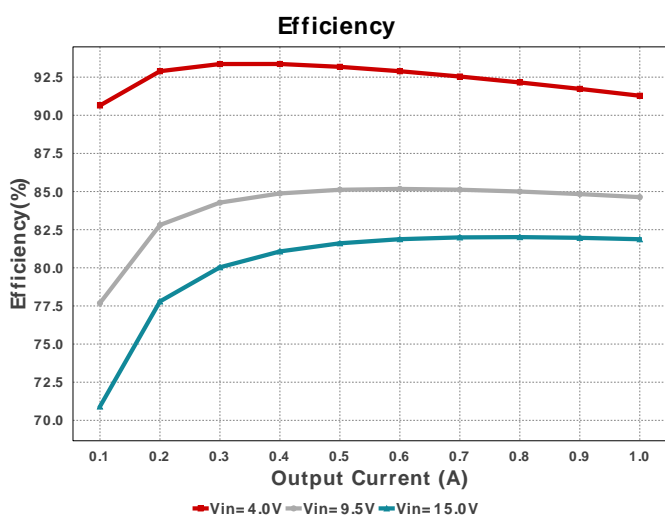
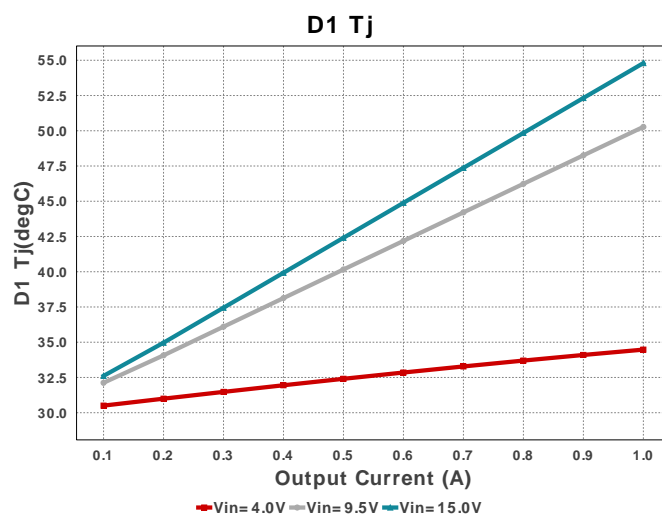
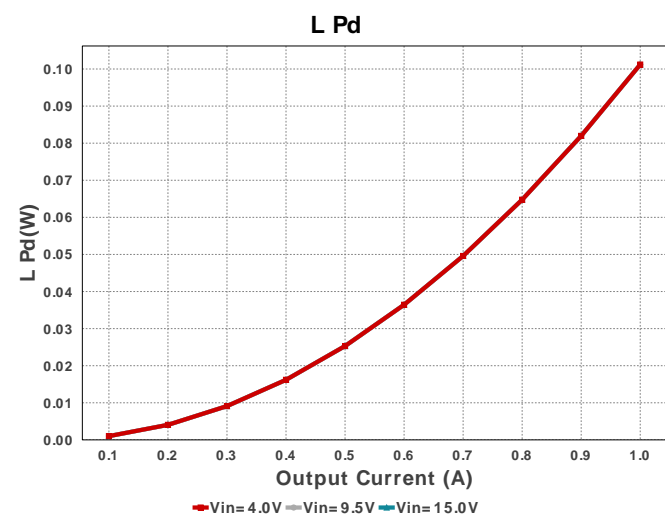


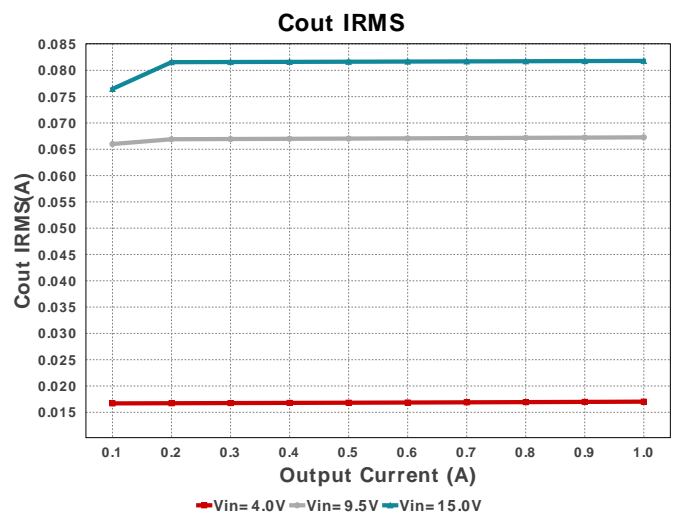
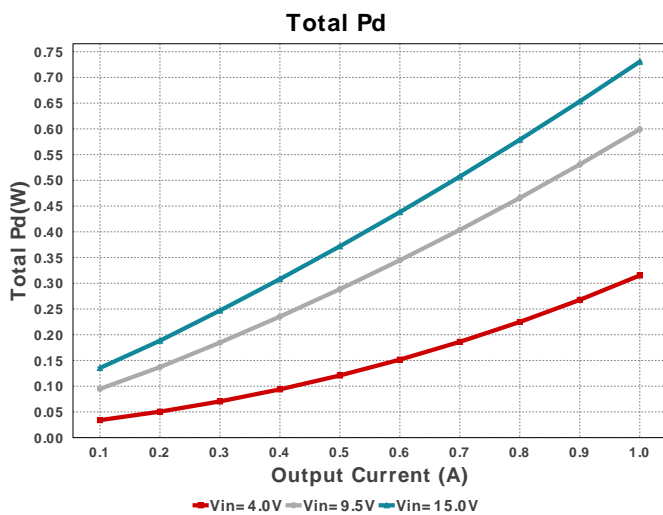
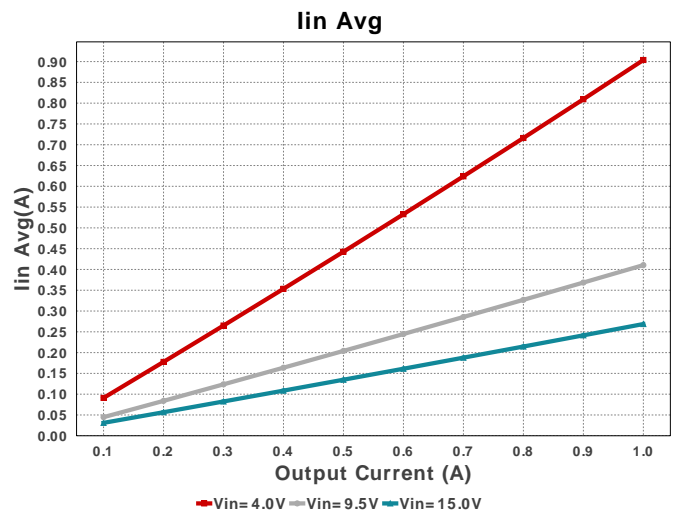
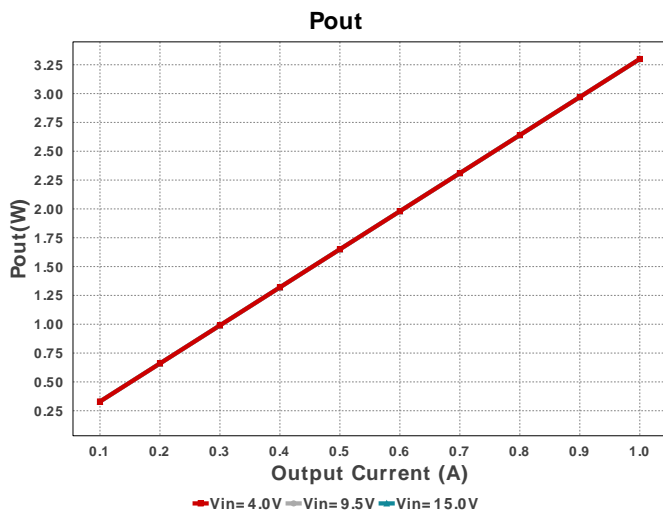
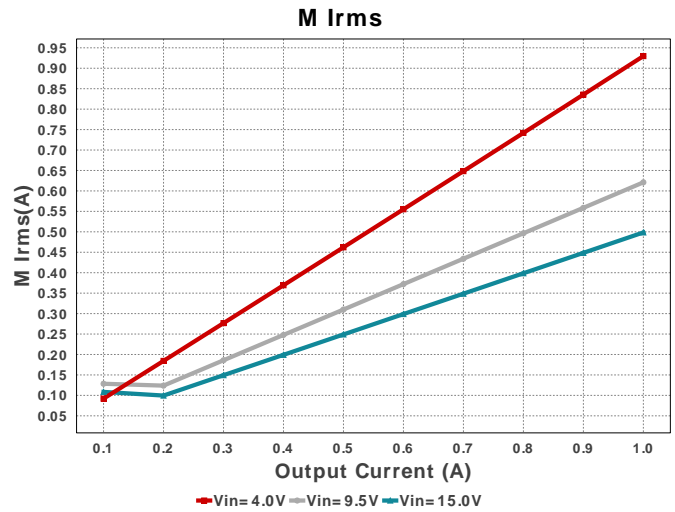
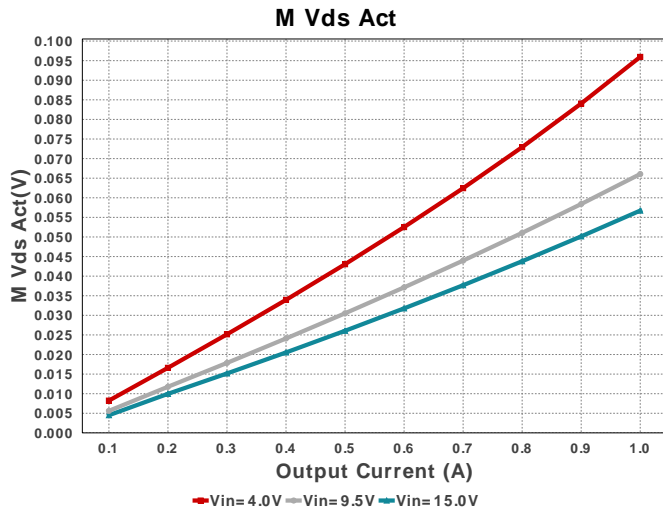
## Electrical BOM

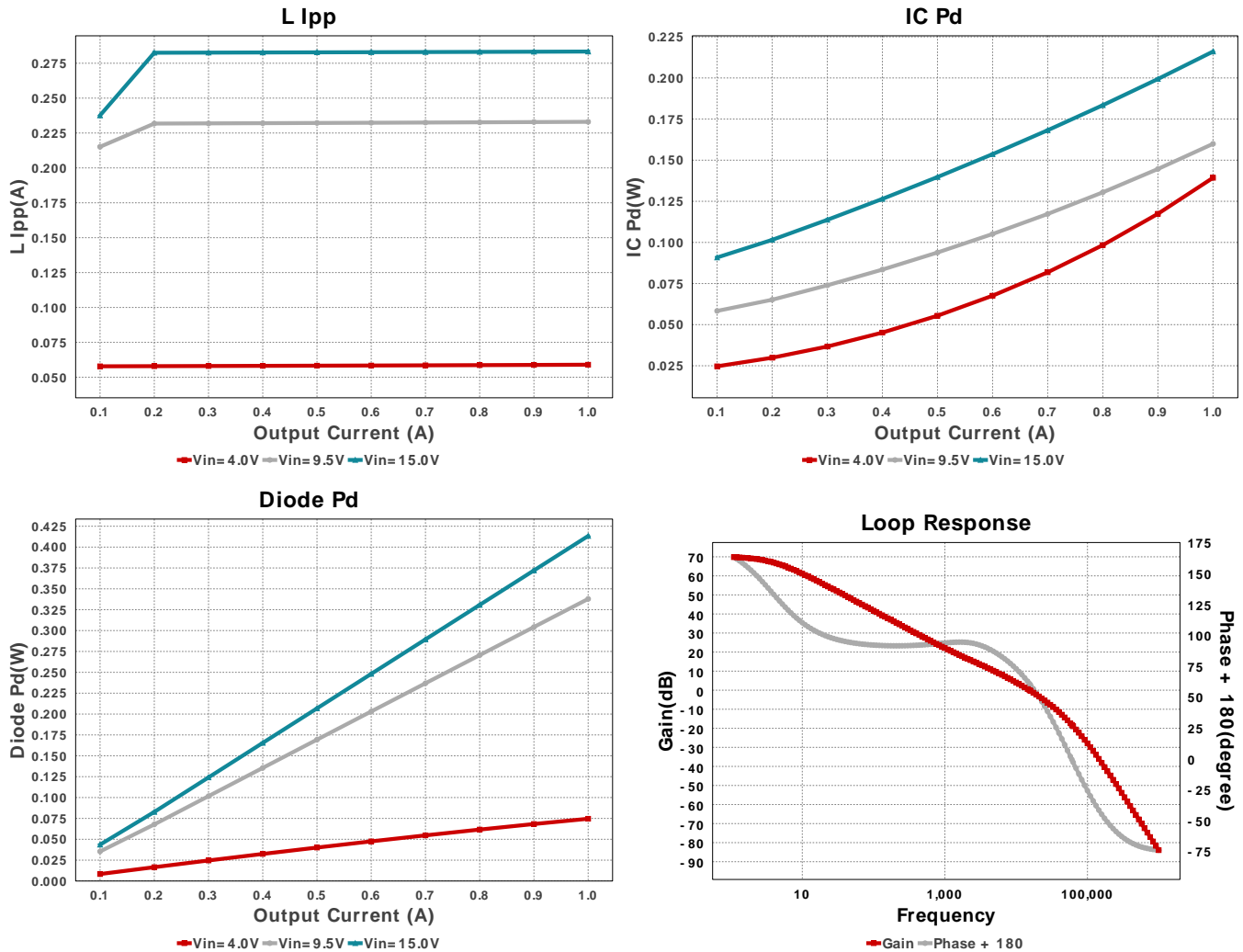
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R71A104KA01D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm <sup>2</sup>
2.	Ccomp	TDK	CGA4C2C0G1H472J060AA Series= C0G/NP0	Cap= 4.7 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.04	 0805 7 mm <sup>2</sup>
3.	Ccomp2	MuRata	GRM0335C1H111JA01D Series= C0G/NP0	Cap= 110.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0201 2 mm <sup>2</sup>
4.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	2	\$0.20	 1210 15 mm <sup>2</sup>
5.	Cout	MuRata	GRM31CR60J476ME19L Series= X5R	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.091 A	1	\$0.12	 1206_190 11 mm <sup>2</sup>
6.	Css	MuRata	GRM033R61A822KA01D Series= X5R	Cap= 8.2 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0201 2 mm <sup>2</sup>
7.	D1	Fairchild Semiconductor	SS24FL	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.07	 SOD-123F 12 mm <sup>2</sup>
8.	L1	Bourns	SRR6038-180Y	L= 18.0 uH DCR= 82.0 mOhm	1	\$0.29	 SRR6038 77 mm <sup>2</sup>
9.	Rcomp	Yageo America	RC0201FR-0715K4L Series= ?	Res= 15.4 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm <sup>2</sup>
10.	RenB	Vishay-Dale	CRCW04021M02FKED Series= CRCW...e3	Res= 1.02 MOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
11.	RenT	Yageo America	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm <sup>2</sup>

#	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 <sup>2</sup>
13.	Rfbt	Vishay-Dale	CRCW080510K2FKEA Series= CRCW..e3	Res= 10.2 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
14.	U1	Texas Instruments	TPS54231DR	Switcher	1	\$0.55	

D0008A 57 mm<sup>2</sup>







## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	188.615 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	81.802 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	0.0 A	Current	Peak switch current in IC
4.	Iin Avg	268.71 mA	Current	Average input current
5.	L Ipp	283.37 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	498.493 mA	Current	Q lavg
7.	BOM Count	15	General	Total Design BOM count
8.	FootPrint	217.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
9.	Frequency	570.0 kHz	General	Switching frequency
10.	M Vds Act	56.726 mV	General	Voltage drop across the MosFET
11.	Mode	CCM	General	Conduction Mode
12.	Pout	3.3 W	General	Total output power
13.	Total BOM	\$1.55	General	Total BOM Cost
14.	Cross Freq	15.352 kHz	Op Point	Bode plot crossover frequency
15.	D1 Tj	54.8 degC	Op Point	D1 junction temperature
16.	Duty Cycle	24.849 %	Op Point	Duty cycle
17.	Efficiency	81.873 %	Op Point	Steady state efficiency
18.	Gain Marg	-18.174 dB	Op Point	Bode Plot Gain Margin
19.	IC Tj	51.605 degC	Op Point	IC junction temperature
20.	ICThetaJA	100.0 degC/W	Op Point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	1.0 A	Op Point	Iout operating point
22.	Low Freq Gain	69.811 dB	Op Point	Gain at 1Hz
23.	Phase Marg	61.466 deg	Op Point	Bode Plot Phase Margin
24.	VIN_OP	15.0 V	Op Point	Vin operating point
25.	Vout Actual	3.319 V	Op Point	Vout Actual calculated based on selected voltage divider resistors
26.	Vout OP	3.3 V	Op Point	Operational Output Voltage
27.	Vout Tolerance	5.087 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
28.	Vout p-p	2.323 mV	Op Point	Peak-to-peak output ripple voltage
29.	Cin Pd	35.575 μW	Power	Input capacitor power dissipation
30.	Cout Pd	24.993 μW	Power	Output capacitor power dissipation

#	Name	Value	Category	Description
31.	Diode Pd	413.328 mW	Power	Diode power dissipation
32.	IC Pd	216.053 mW	Power	IC power dissipation
33.	L Pd	101.2 mW	Power	Inductor power dissipation
34.	Total Pd	730.636 mW	Power	Total Power Dissipation

## Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	15.0	Maximum input voltage
3.	VinMin	4.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS54231	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

## Design Assistance

1. **TPS54231** Product Folder : <http://www.ti.com/product/TPS54231> : contains the data sheet and other resources.

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

**You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.**

Use of Texas Instruments' WEBENCH simulation tools is subject to [Texas Instruments' Site Terms and Conditions of Use](#). Prototype boards based on WEBENCH created designs are provided AS IS without warranty of any kind for evaluation and testing purposes and are subject to the terms of the [Evaluation License Agreement](#).