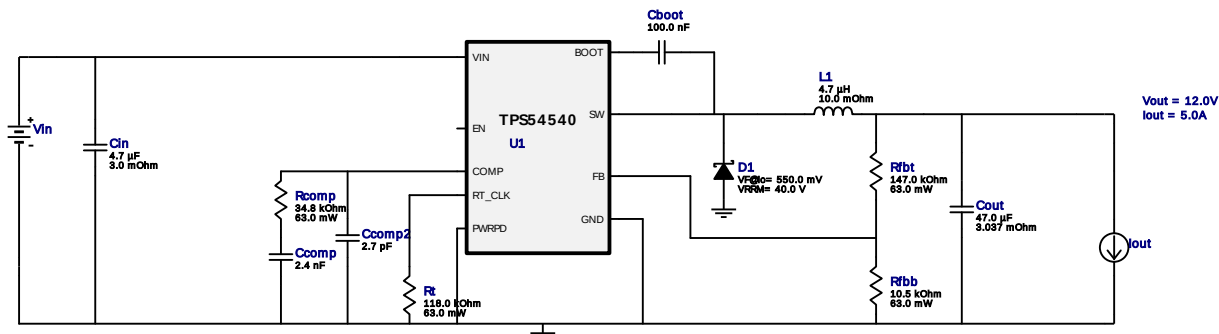
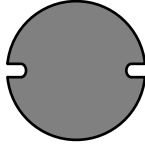


WEBENCH® Design Report

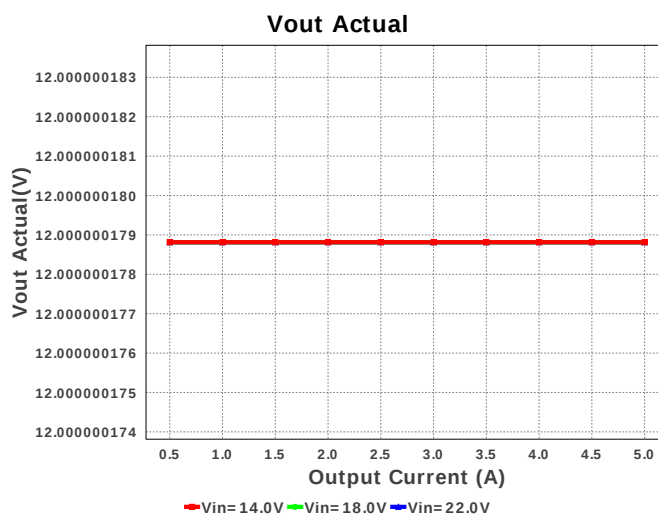
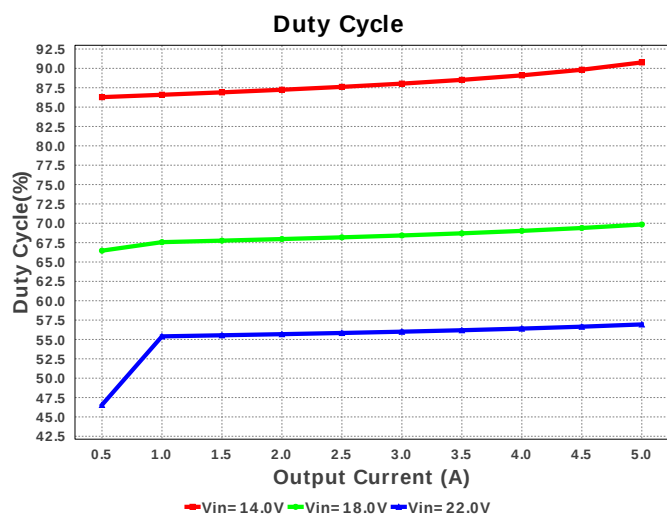
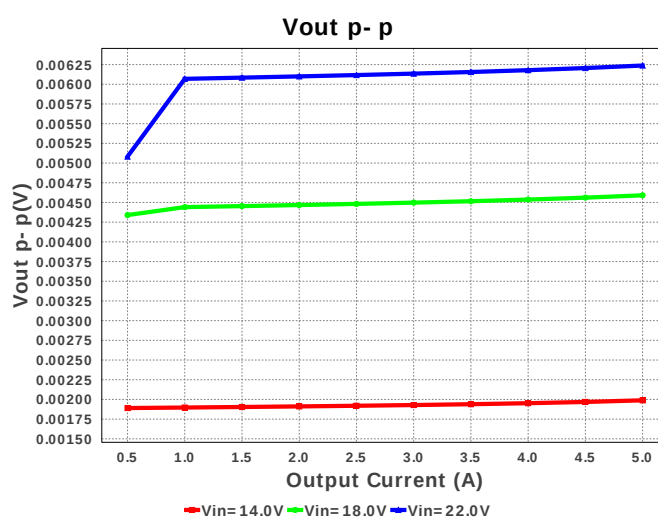
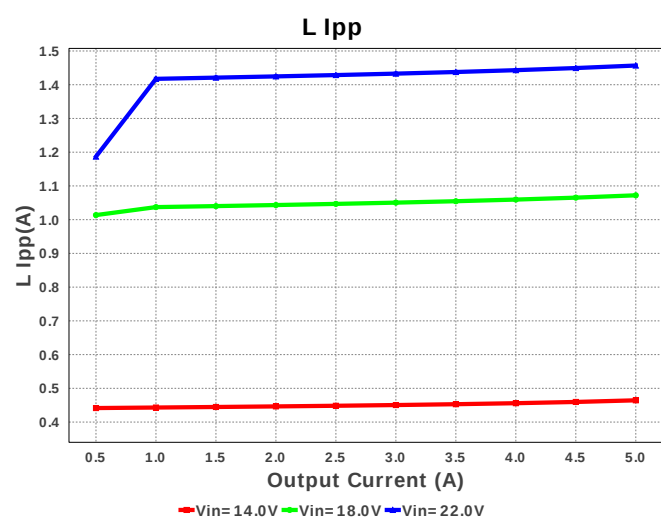
Design : 1165565/16 TPS54540DDAR
TPS54540DDAR 14.0V-22.0V to 12.00V @ 5.0A

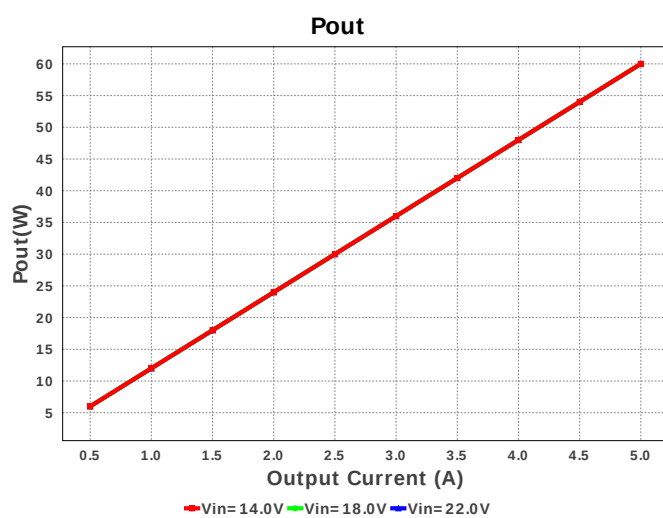
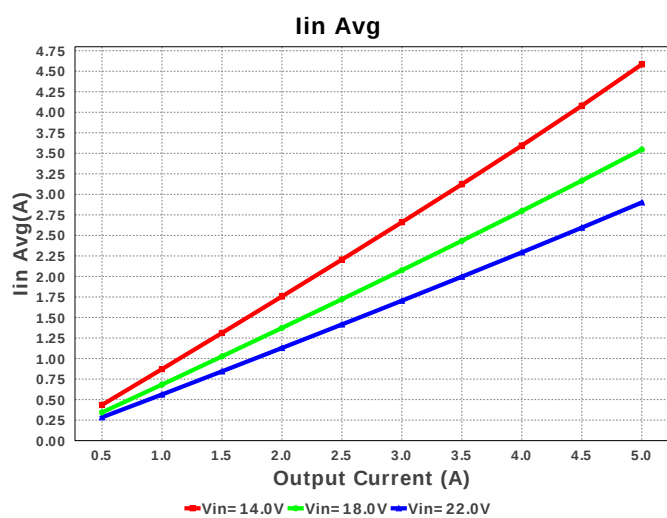
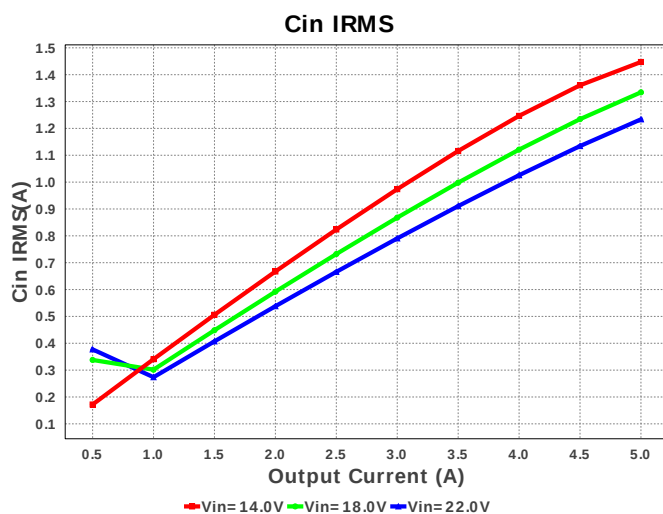
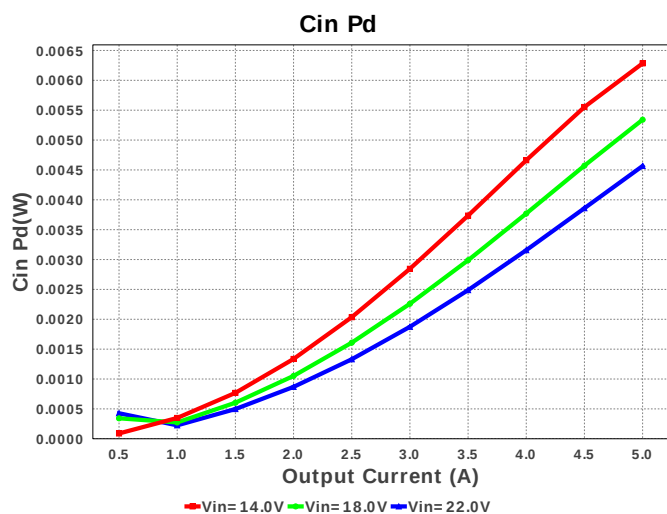
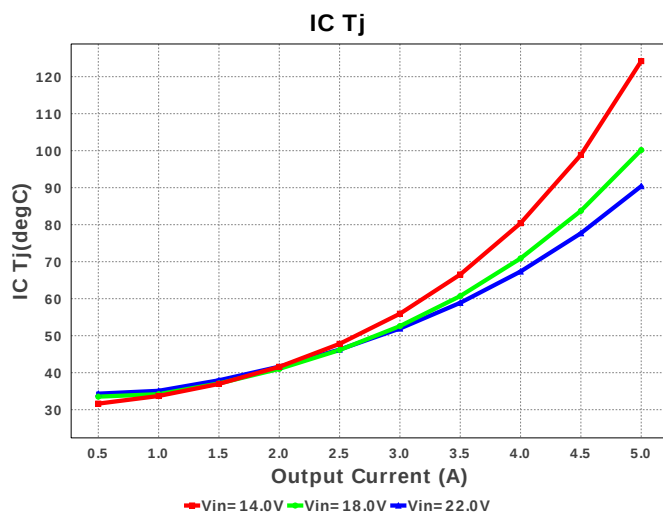
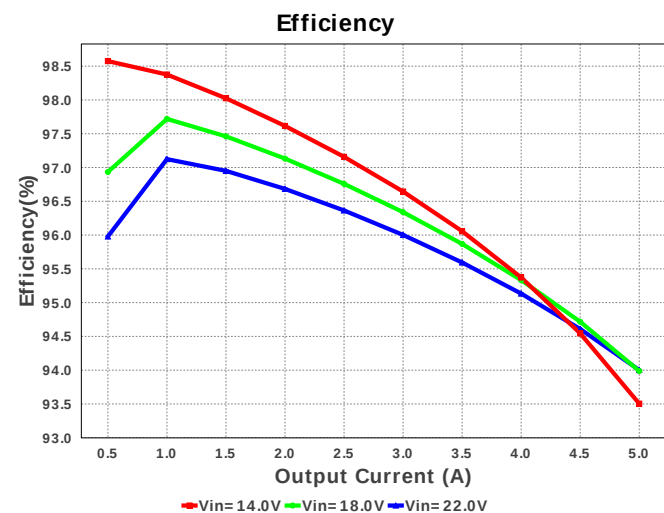


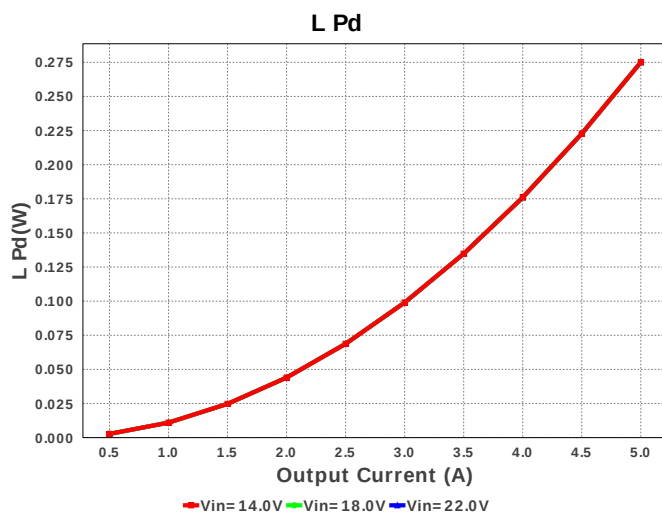
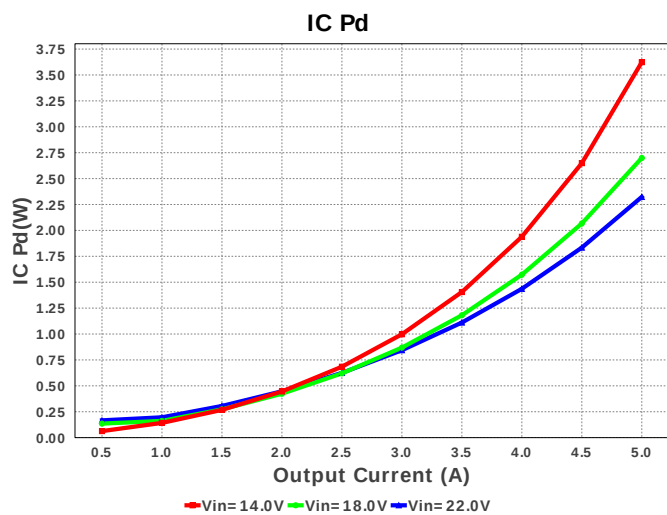
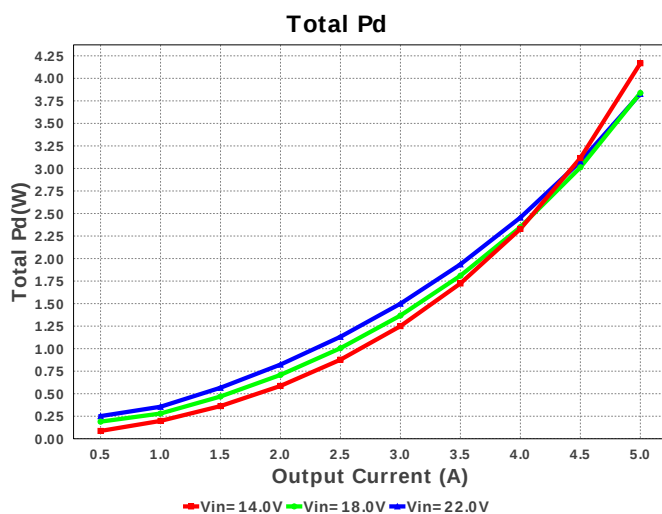
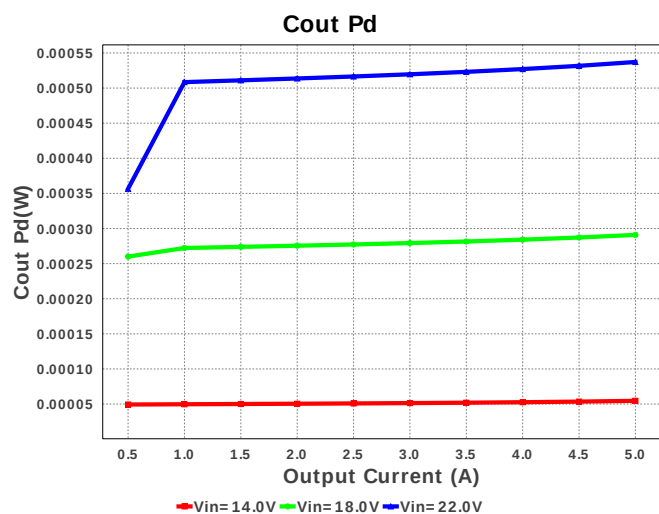
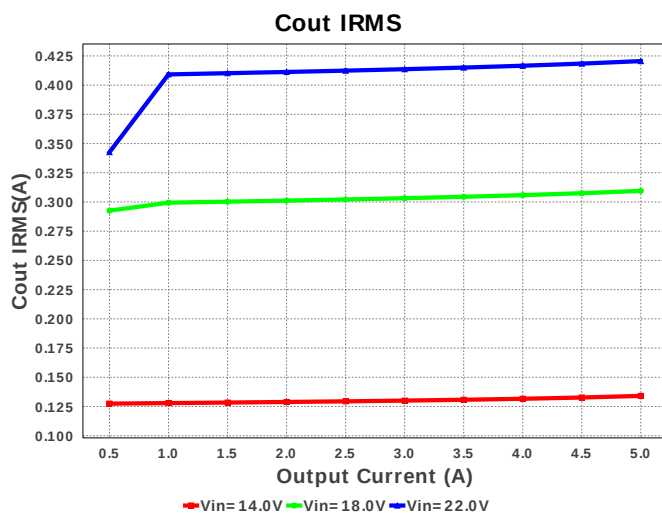
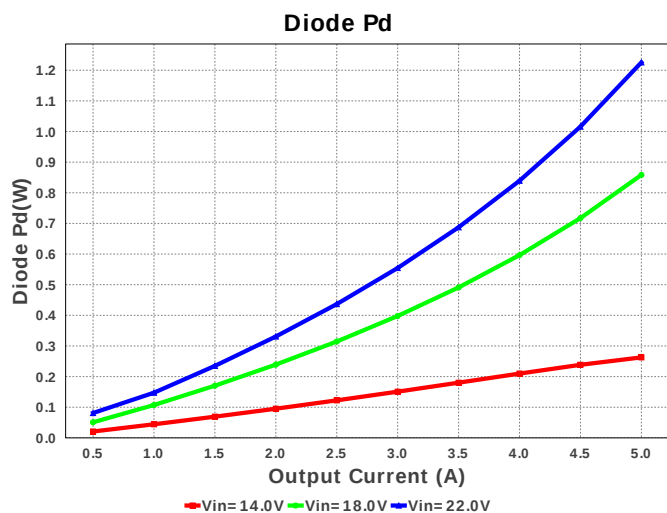
Electrical BOM

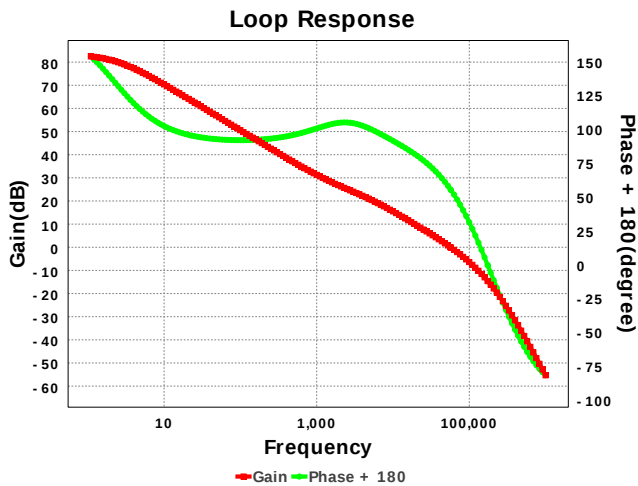
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
2.	Ccomp	MuRata	GRM1885C1H242JA01D Series= C0G/NP0	Cap= 2.4 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0603 5 mm ²
3.	Ccomp2	MuRata	GRM1555C1H2R7CA01D Series= C0G/NP0	Cap= 2.7 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
4.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	\$0.07	 1206 11 mm ²
5.	Cout	MuRata	GRM32ER61C476ME15L Series= X5R	Cap= 47.0 uF ESR= 3.037 mOhm VDC= 16.0 V IRMS= 4.59346 A	1	\$0.24	 1210_280 15 mm ²
6.	D1	Diodes Inc.	B540C-13-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.17	 SMC 83 mm ²
7.	L1	Bourns	SDR1307-4R7ML	L= 4.7 uH DCR= 10.0 mOhm	1	\$0.35	 SDR1307 227 mm ²
8.	Rcomp	Vishay-Dale	CRCW040234K8FKED Series= CRCW..e3	Res= 34.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
9.	Rfbb	Vishay-Dale	CRCW040210K5FKED Series= CRCW..e3	Res= 10.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
10.	Rfbb	Vishay-Dale	CRCW0402147KFKED Series= CRCW..e3	Res= 147.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	Rt	Vishay-Dale	CRCW0402118KFKED Series= CRCW..e3	Res= 118.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	U1	Texas Instruments	TPS54540DDAR	Switcher	1	\$1.95	

R-PDSO-G8 57 mm²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.234 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	420.559 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	2.901 A	Current	Average input current
4.	L Ipp	1.457 A	Current	Peak-to-peak inductor ripple current
5.	BOM Count	12	General	Total Design BOM count
6.	FootPrint	415.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	831.593 kHz	General	Switching frequency
8.	Pout	60.0 W	General	Total output power
9.	Total BOM	\$2.85	General	Total BOM Cost
10.	ICThetaJA Effective	26.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
11.	Low Freq Gain	82.455 dB	Op_Point	Gain at 10Hz
12.	Vout Actual	12.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
14.	Cross Freq	56.705 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	56.941 %	Op_point	Duty cycle
16.	Efficiency	94.002 %	Op_point	Steady state efficiency
17.	Gain Marg	-14.653 dB	Op_point	Bode Plot Gain Margin
18.	IC Tj	90.402 degC	Op_point	IC junction temperature
19.	IOUT_OP	5.0 A	Op_point	Iout operating point
20.	Phase Marg	56.261 deg	Op_point	Bode Plot Phase Margin
21.	VIN_OP	22.0 V	Op_point	Vin operating point
22.	Vout p-p	6.238 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	4.566 mW	Power	Input capacitor power dissipation
24.	Cout Pd	537.153 μ W	Power	Output capacitor power dissipation
25.	Diode Pd	1.225 W	Power	Diode power dissipation
26.	IC Pd	2.323 W	Power	IC power dissipation
27.	L Pd	275.0 mW	Power	Inductor power dissipation
28.	Total Pd	3.828 W	Power	Total Power Dissipation
29.	Vout Tolerance	2.904 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	12.0	Output Voltage
5.	base_pn	TPS54540	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. TPS54540 Product Folder : <http://www.ti.com/product/TPS54540> : 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](#).