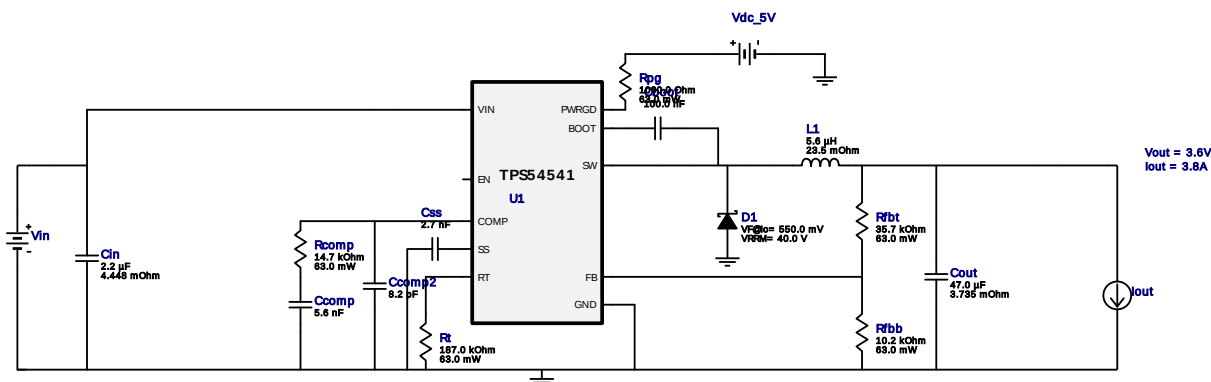


WEBENCH® Design Report

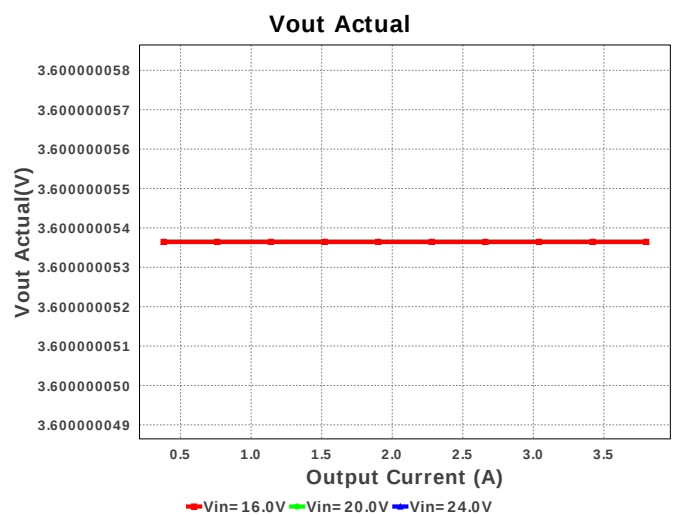
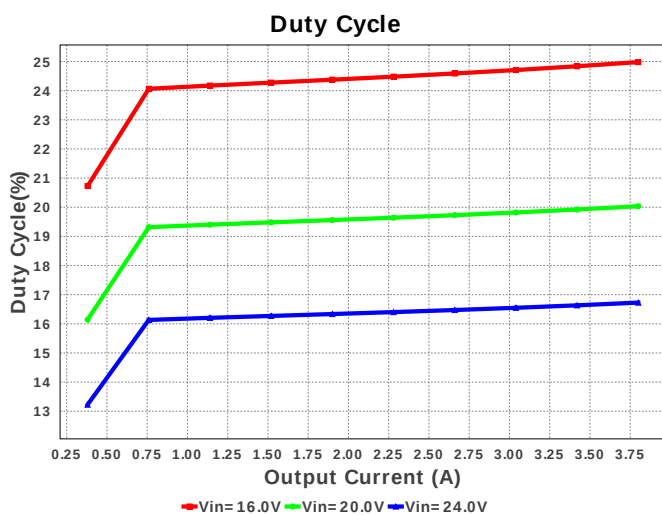
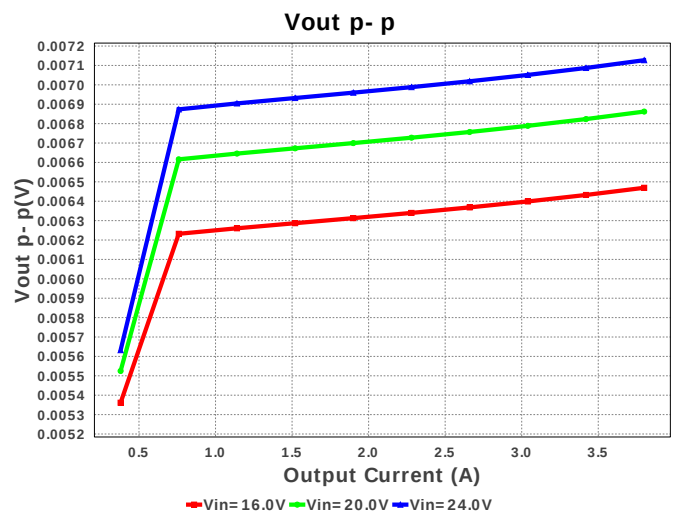
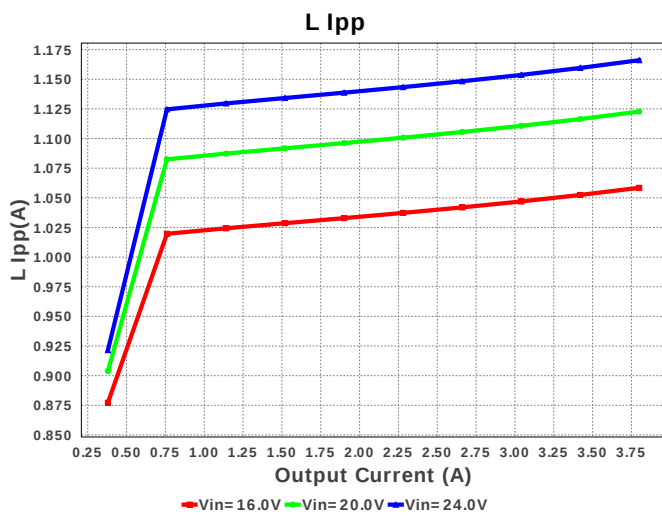
Design : 4763576/5 TPS54541DPRR
TPS54541DPRR 16.0V-24.0V to 3.60V @ 3.8A

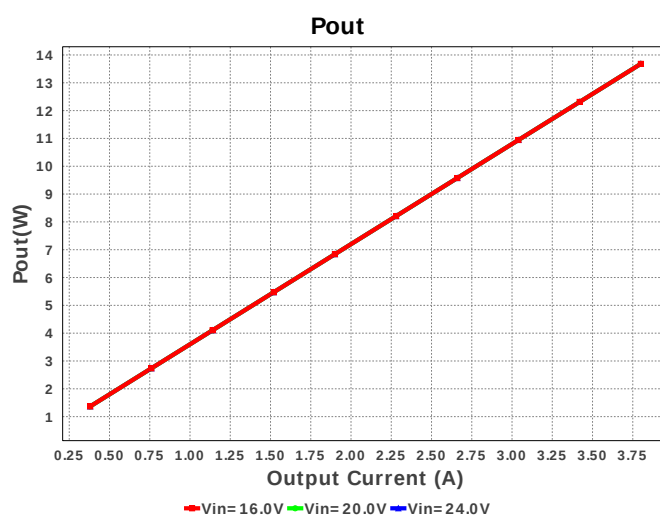
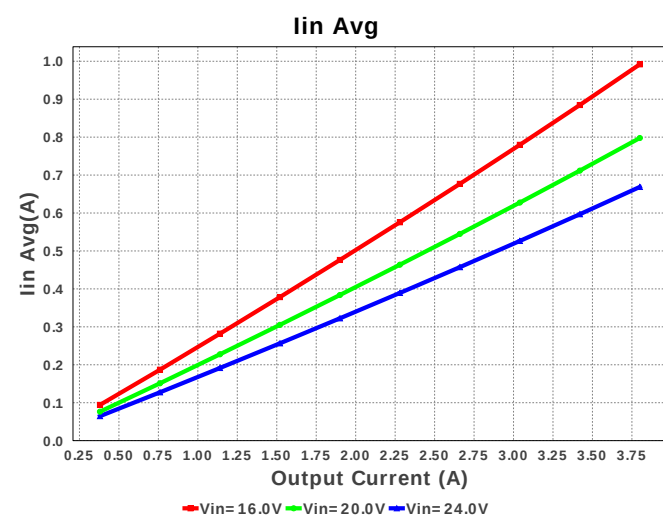
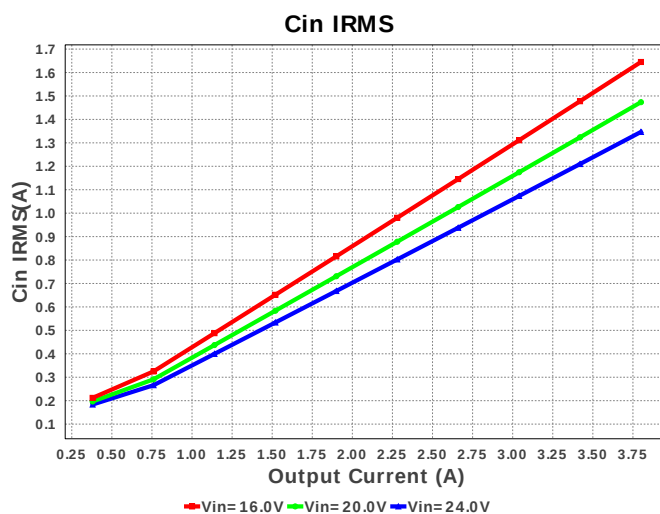
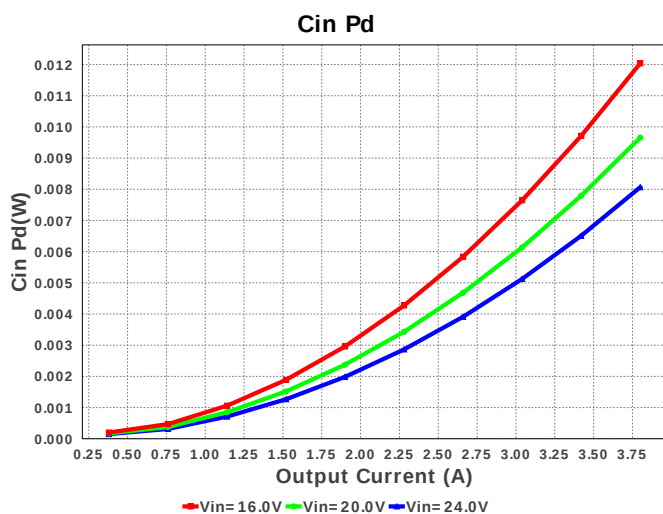
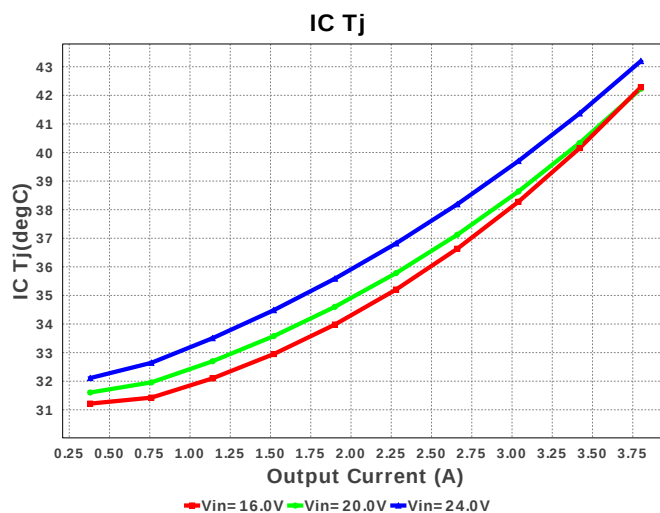
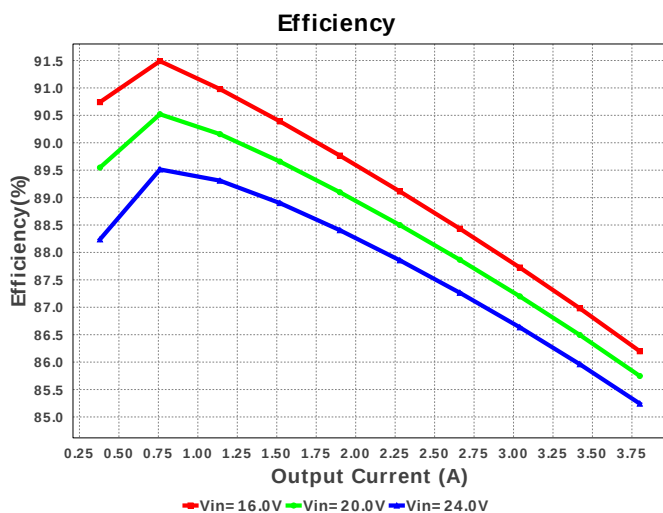


Electrical BOM

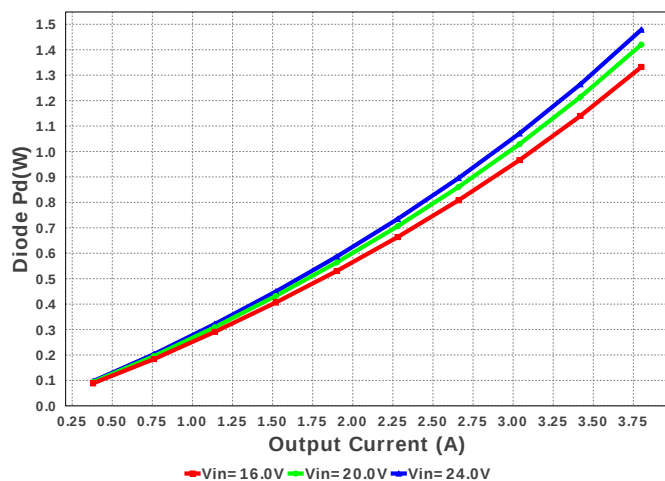
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
2.	Ccomp	Yageo America	CC0805KRX7R9BB562 Series= X7R	Cap= 5.6 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
3.	Ccomp2	MuRata	GRM1555C1H8R2CA01D Series= C0G/NP0	Cap= 8.2 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
4.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	\$0.05	 1206_190 11 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	Yageo America	CC0805KRX7R9BB272 Series= X7R	Cap= 2.7 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
7.	D1	Diodes Inc.	B540C-13-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.17	 SMC 83 mm ²
8.	L1	Coilcraft	XAL5050-562MEB	L= 5.6 uH DCR= 23.5 mOhm	1	\$0.92	 XAL5050 54 mm ²
9.	Rcomp	Vishay-Dale	CRCW040214K7FKED Series= CRCW..e3	Res= 14.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
10.	Rfbb	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	Rfbs	Vishay-Dale	CRCW040235K7FKED Series= CRCW..e3	Res= 35.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rpg	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
13.	Rt	Vishay-Dale	CRCW0402187KFKED Series= CRCW..e3	Res= 187.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
14.	U1	Texas Instruments	TPS54541DPRR	Switcher	1	\$2.30	 DPR0010A 25 mm ²

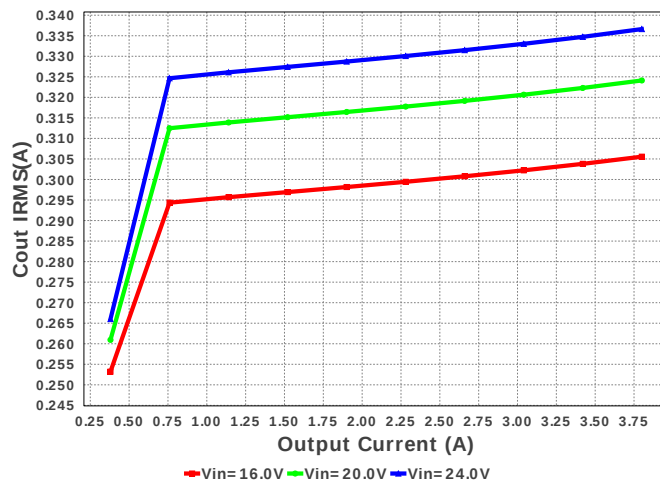




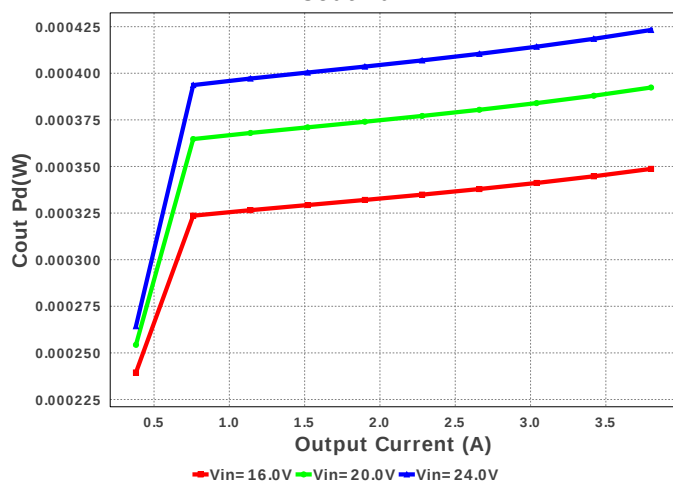
Diode Pd



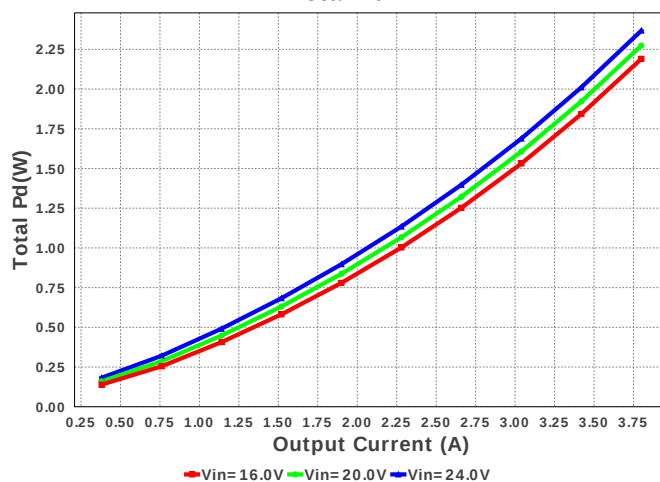
Cout IRMS



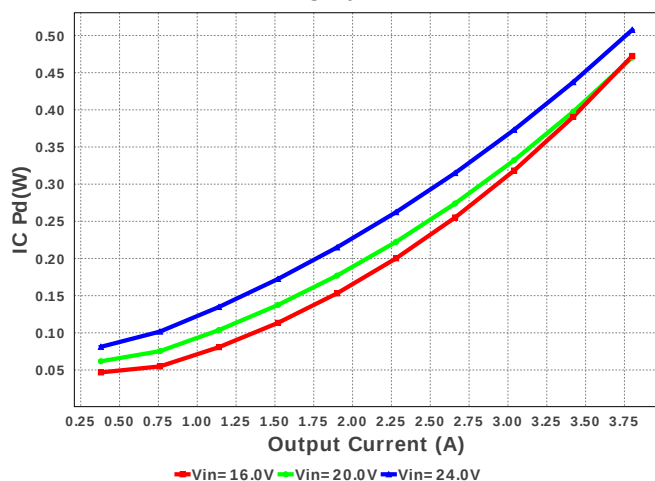
Cout Pd



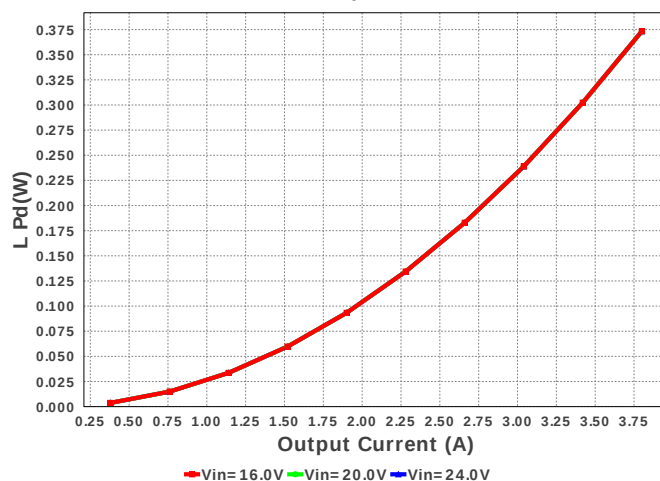
Total Pd

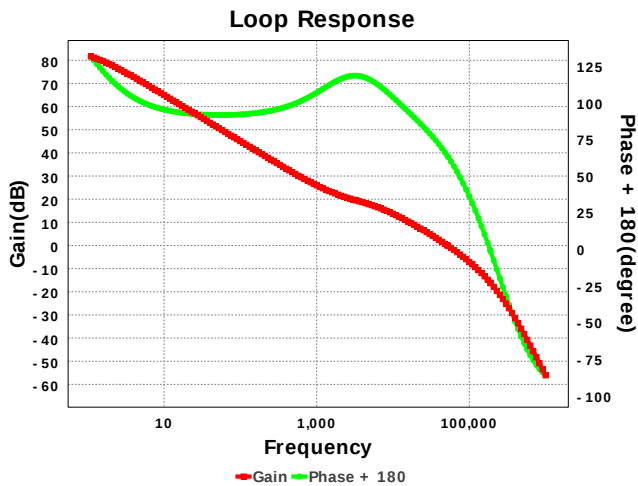


IC Pd



L Pd





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.356 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	343.192 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	681.18 mA	Current	Average input current
4.	L Ipp	1.189 A	Current	Peak-to-peak inductor ripple current
5.	BOM Count	14	General	Total Design BOM count
6.	FootPrint	219.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	522.579 kHz	General	Switching frequency
8.	Pout	13.68 W	General	Total output power
9.	Total BOM	\$3.63	General	Total BOM Cost
10.	ICThetaJA Effective	26.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
11.	Low Freq Gain	81.659 dB	Op_Point	Gain at 10Hz
12.	Vout Actual	3.6 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	3.6 V	Op_Point	Operational Output Voltage
14.	Cross Freq	51.789 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	17.054 %	Op_point	Duty cycle
16.	Efficiency	83.679 %	Op_point	Steady state efficiency
17.	Gain Marg	-16.022 dB	Op_point	Bode Plot Gain Margin
18.	IC Tj	43.322 degC	Op_point	IC junction temperature
19.	IOUT_OP	3.8 A	Op_point	Iout operating point
20.	Phase Marg	64.067 deg	Op_point	Bode Plot Phase Margin
21.	VIN_OP	24.0 V	Op_point	Vin operating point
22.	Vout p-p	7.266 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	8.175 mW	Power	Input capacitor power dissipation
24.	Cout Pd	439.912 μ W	Power	Output capacitor power dissipation
25.	Diode Pd	1.774 W	Power	Diode power dissipation
26.	IC Pd	512.389 mW	Power	IC power dissipation
27.	L Pd	373.274 mW	Power	Inductor power dissipation
28.	Total Pd	2.668 W	Power	Total Power Dissipation
29.	Vout Tolerance	2.587 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	3.8	Maximum Output Current
2.	VinMax	24.0	Maximum input voltage
3.	VinMin	16.0	Minimum input voltage
4.	Vout	3.6	Output Voltage
5.	base_pn	TPS54541	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54541** Product Folder : <http://www.ti.com/product/TPS54541> : contains the data sheet and other resources.

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