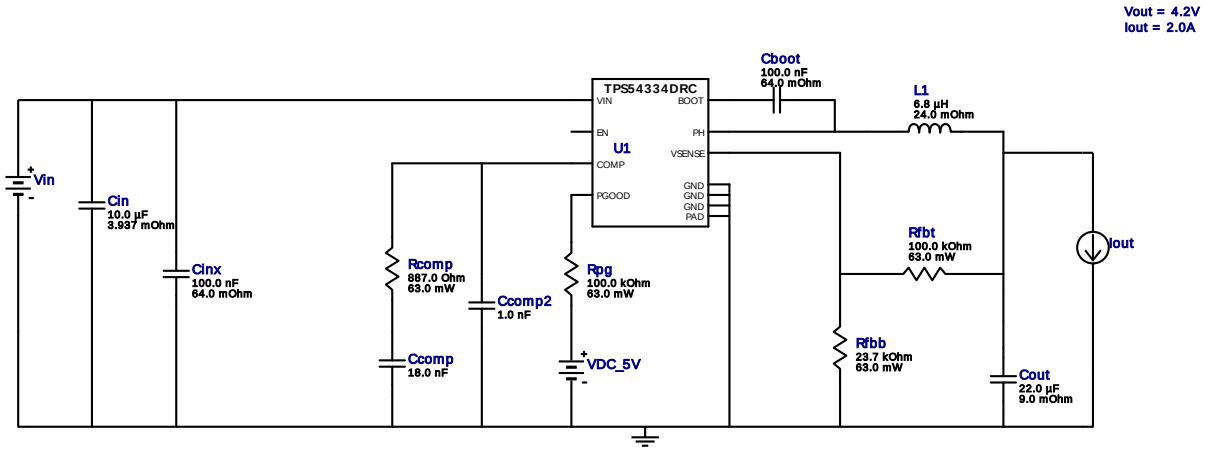
WEBENCH® Design Report

VinMin = 6.0V
VinMax = 8.4V
Vout = 4.2V
Iout = 2.0A

Device = TPS54334DRCR
Topology = Buck
Created = 7/17/16 10:59:08 PM
BOM Cost = $1.32
BOM Count = 12
Total Pd = 1.06W

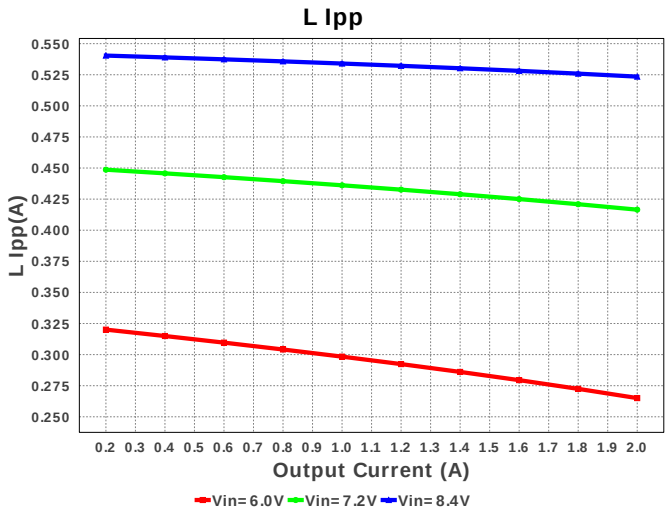
Design : 4743359/41 TPS54334DRCR
TPS54334DRCR 6.0V-8.4V to 4.20V @ 2.0A

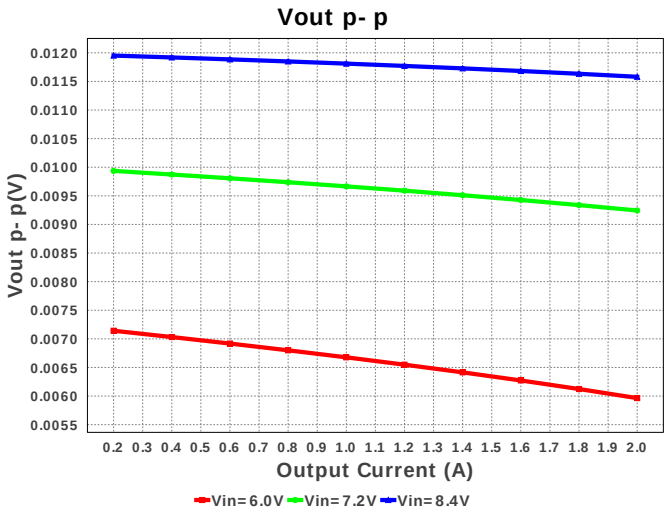


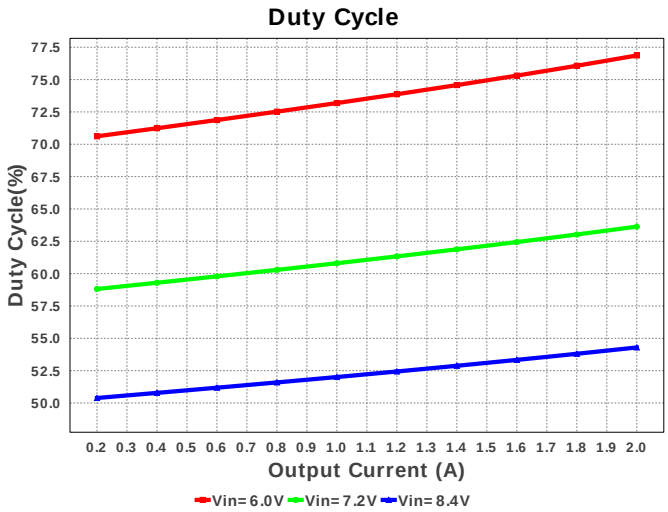
Electrical BOM

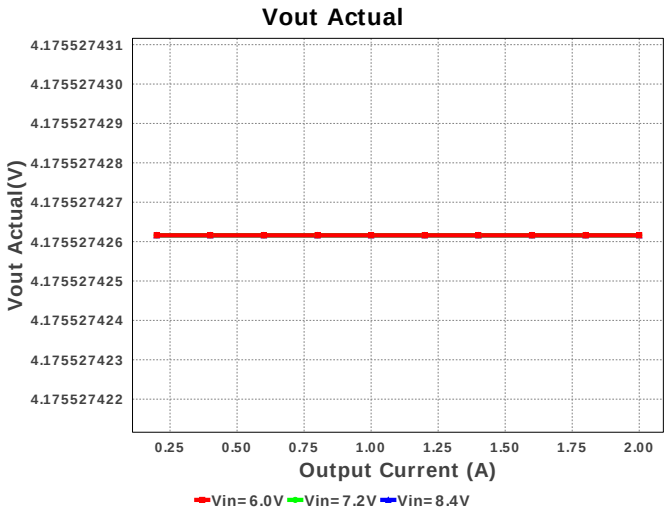
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
2.	Ccomp	Yageo America	CC0805KRX7R9BB183 Series= X7R	Cap= 18.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	MuRata	GRM219R61A106KE44D Series= X5R	Cap= 10.0 uF ESR= 3.937 mOhm VDC= 10.0 V IRMS= 2.7713 A	1	$0.03	0805 7 mm²
5.	Cinx	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
6.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	1	$0.04	0805 7 mm²
7.	L1	TDK	VLP8040T-6R8M	L= 6.8 µH DCR= 24.0 mOhm	1	$0.22	VLP8040 113 mm²
8.	Rcomp	Vishay-Dale	CRCW0402887RFKED Series= CRCW..e3	Res= 887.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rfbb	Vishay-Dale	CRCW040223K7FKED Series= CRCW..e3	Res= 23.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	Rfbt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
12.	U1	Texas Instruments	TPS54334DRCR	Switcher	1	$0.95	DRC0010J 16 mm^2

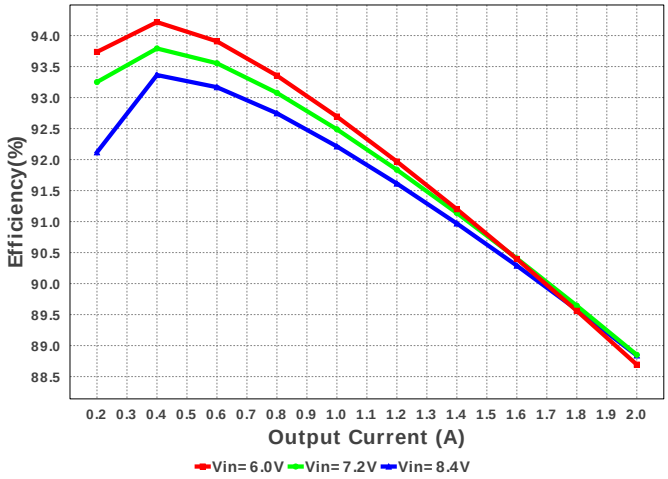




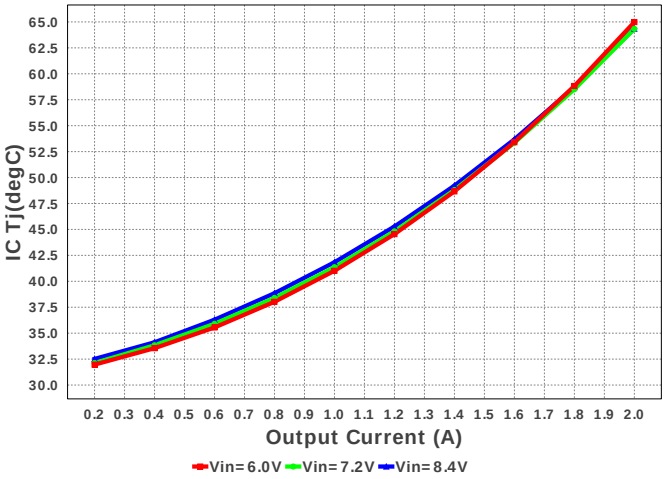




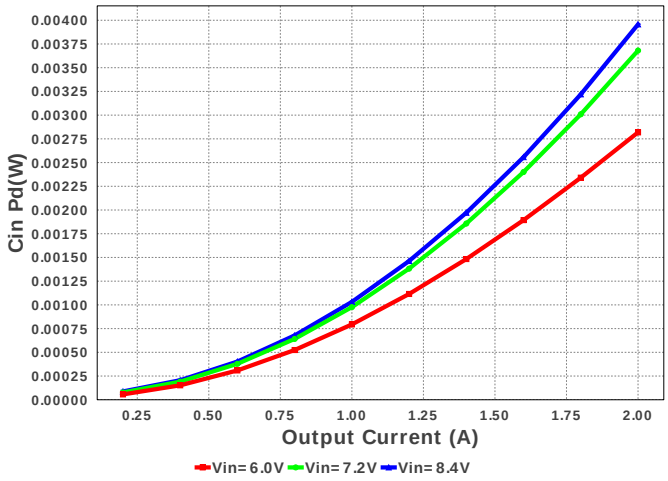
Efficiency



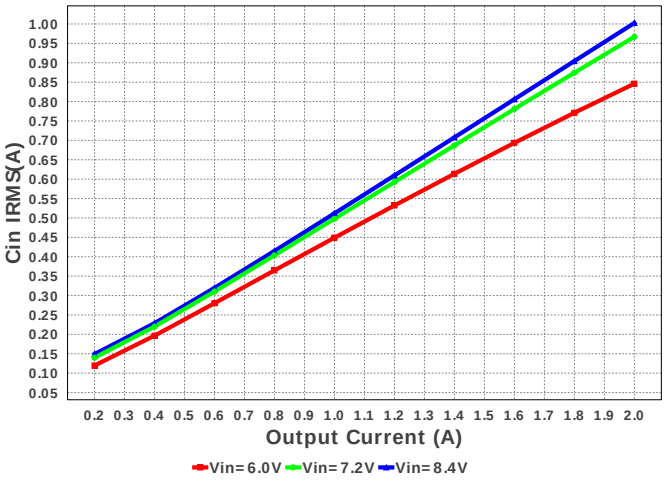
IC Tj



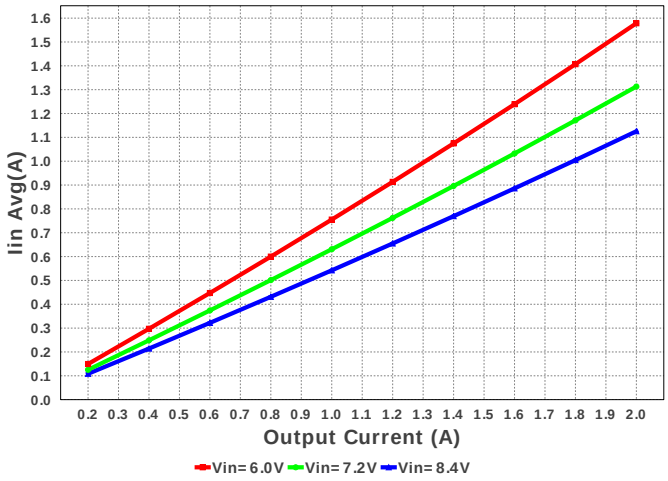
Cin Pd



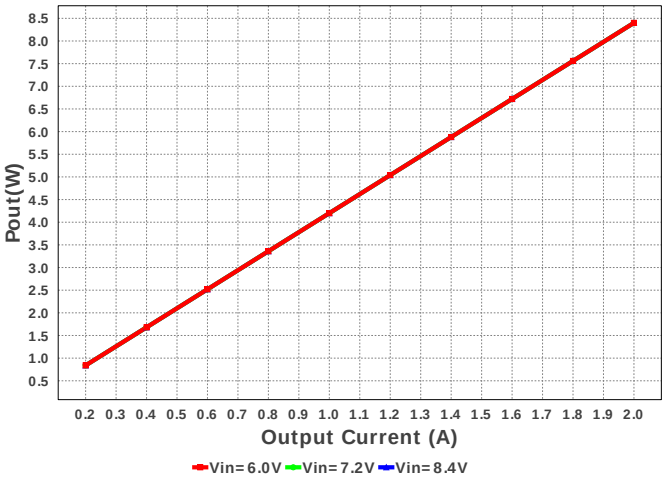
Cin IRMS

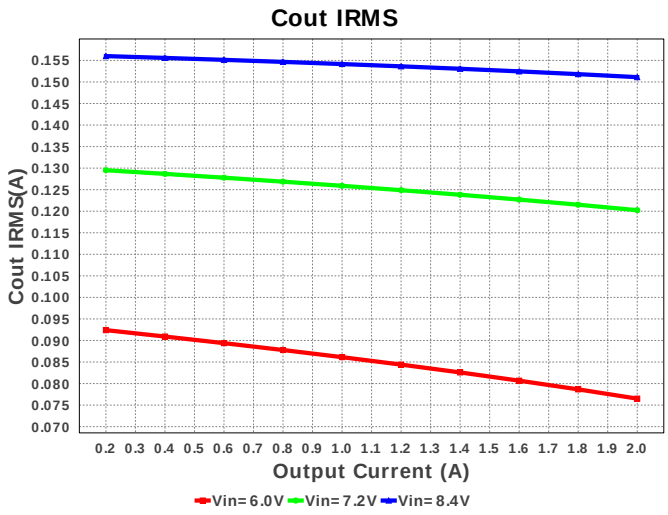


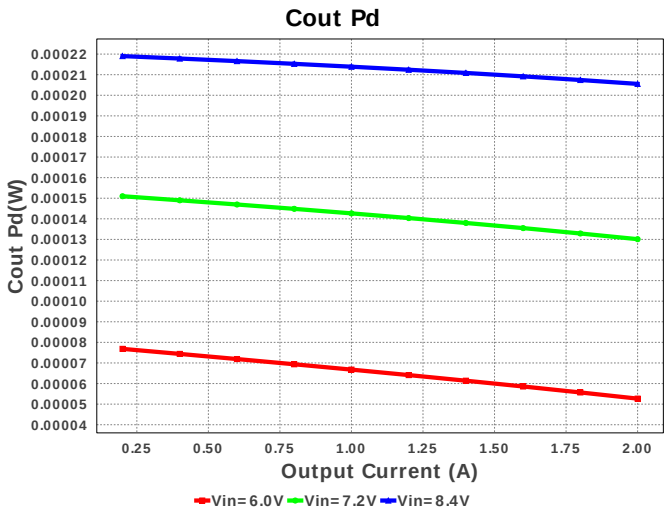
Iin Avg

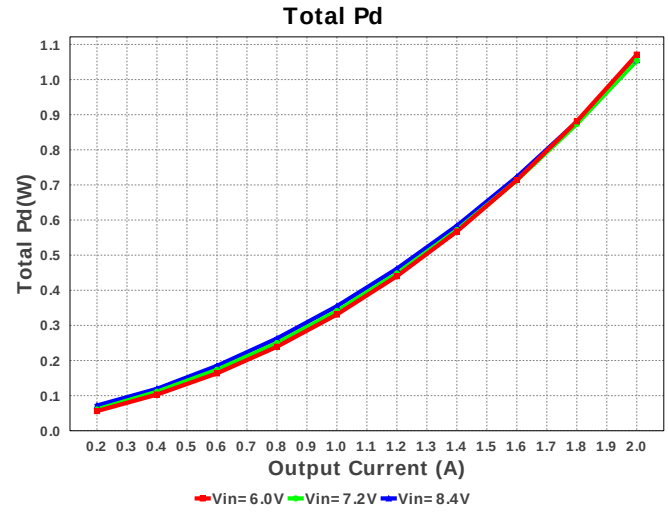


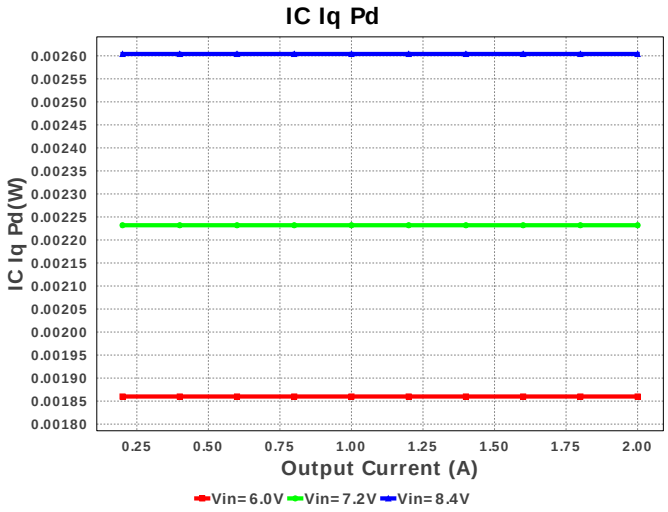
Pout

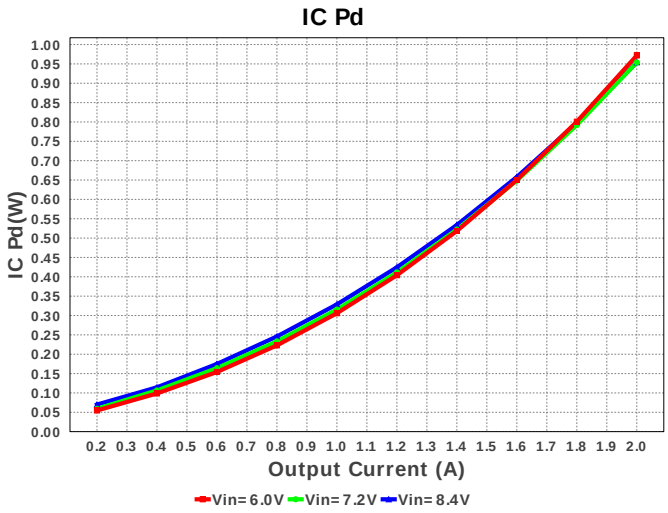


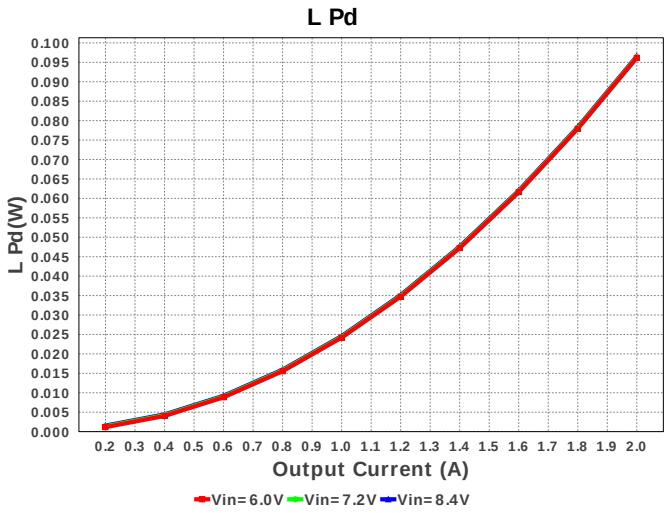


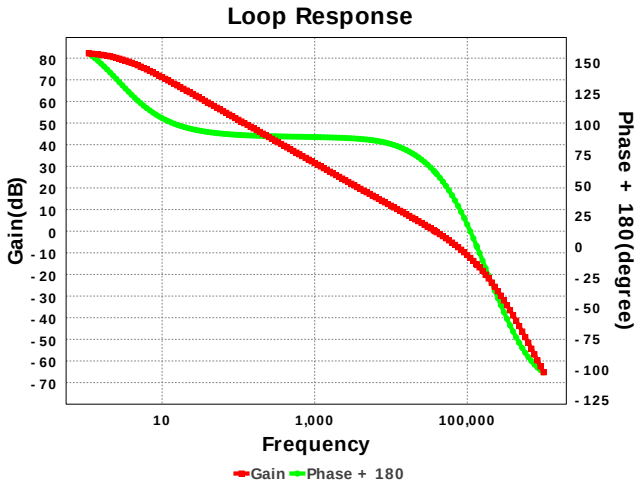












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.003 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	151.117 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.126 A	Current	Average input current
4.	L Ipp	523.48 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	12	General	Total Design BOM count
6.	FootPrint	182.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	570.0 kHz	General	Switching frequency
8.	IC Tolerance	10.0 mV	General	IC Feedback Tolerance
9.	Pout	8.4 W	General	Total output power
10.	Total BOM	$1.32	General	Total BOM Cost
11.	ICThetaJA Effective	36.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
12.	Low Freq Gain	82.185 dB	Op_Point	Gain at 10Hz
13.	Vout Actual	4.176 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	4.2 V	Op_Point	Operational Output Voltage
15.	Cross Freq	37.911 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	54.294 %	Op_point	Duty cycle
17.	Efficiency	88.841 %	Op_point	Steady state efficiency
18.	Gain Marg	-15.498 dB	Op_point	Bode Plot Gain Margin
19.	IC Tj	64.353 degC	Op_point	IC junction temperature
20.	IOUT_OP	2.0 A	Op_point	Iout operating point
21.	Phase Marg	61.02 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	8.4 V	Op_point	Vin operating point
23.	Vout p-p	11.581 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	3.957 mW	Power	Input capacitor power dissipation
25.	Cout Pd	205.527 µW	Power	Output capacitor power dissipation
26.	IC Iq Pd	2.604 mW	Power	IC Iq Pd
27.	IC Pd	954.248 mW	Power	IC power dissipation
28.	L Pd	96.548 mW	Power	Inductor power dissipation
29.	Total Pd	1.055 W	Power	Total Power Dissipation
30.	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	2.0	Maximum Output Current
2.	VinMax	8.4	Maximum input voltage
3.	VinMin	6.0	Minimum input voltage
4.	Vout	4.2	Output Voltage
5.	base_pn	TPS54334	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54334** Product Folder : http://www.ti.com/product/TPS54334 : contains the data sheet and other resources.