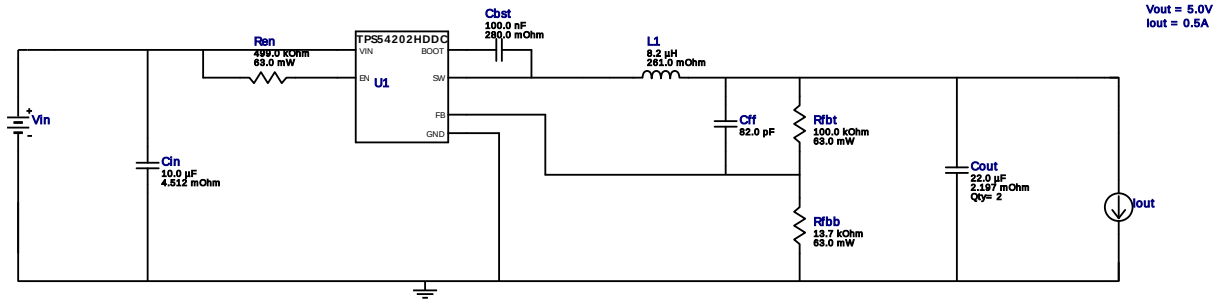
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 12.0V
Vout = 5.0V
Iout = 0.5A

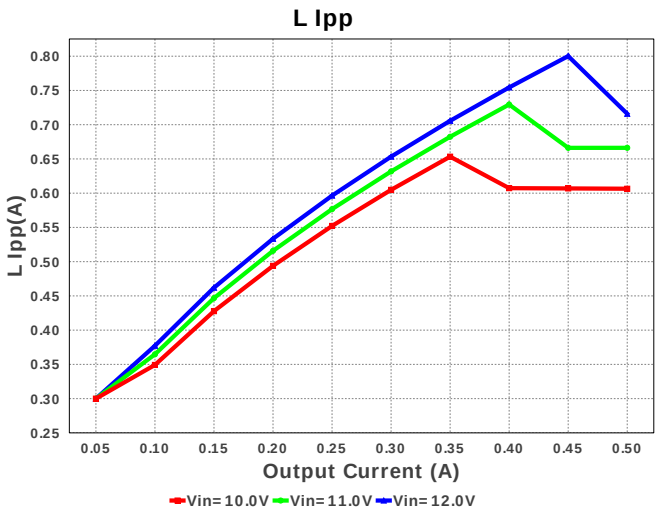
Device = TPS54202HDDCR
Topology = Buck
Created = 7/21/16 9:00:06 PM
BOM Cost = $1.83
BOM Count = 10
Total Pd = 0.22W

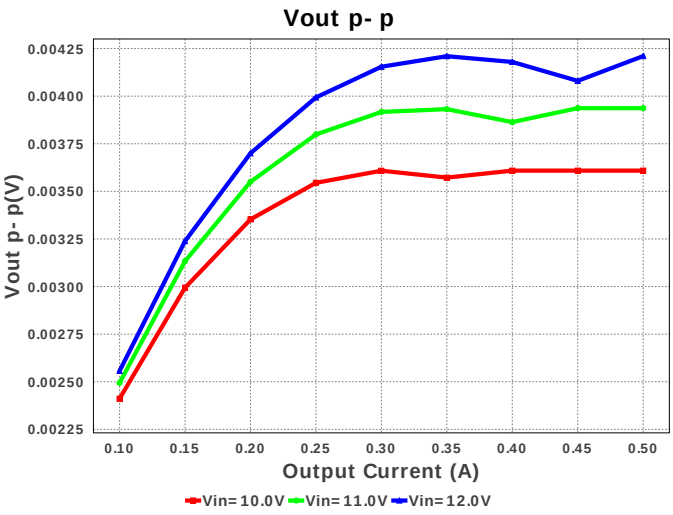
Design : 4742013/257 TPS54202HDDCR
TPS54202HDDCR 10.0V-12.0V to 5.00V @ 0.5A

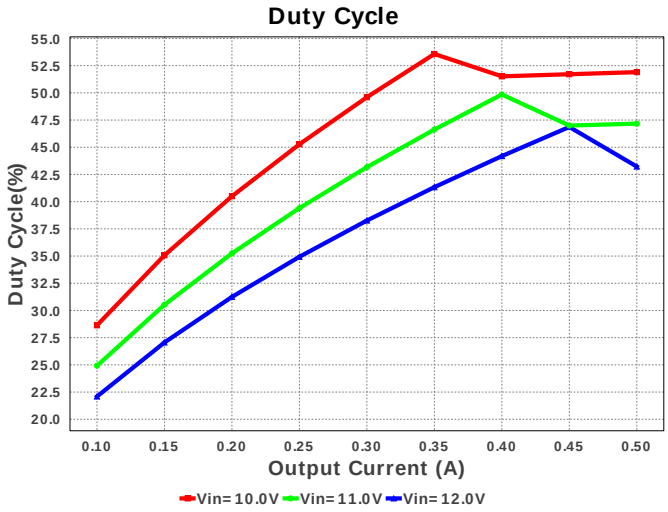


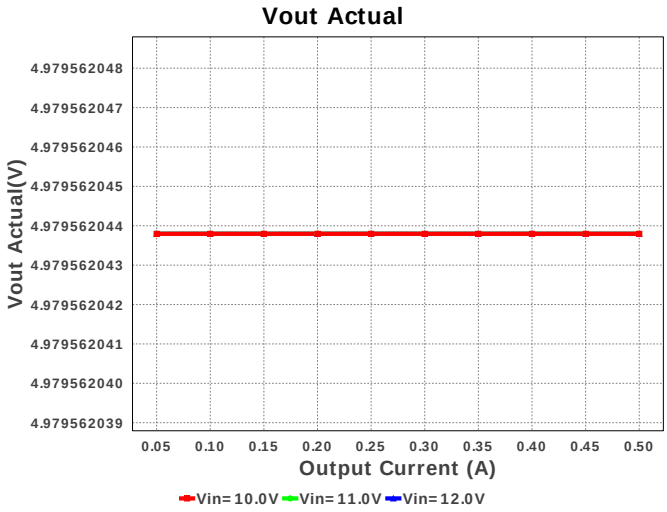
Electrical BOM

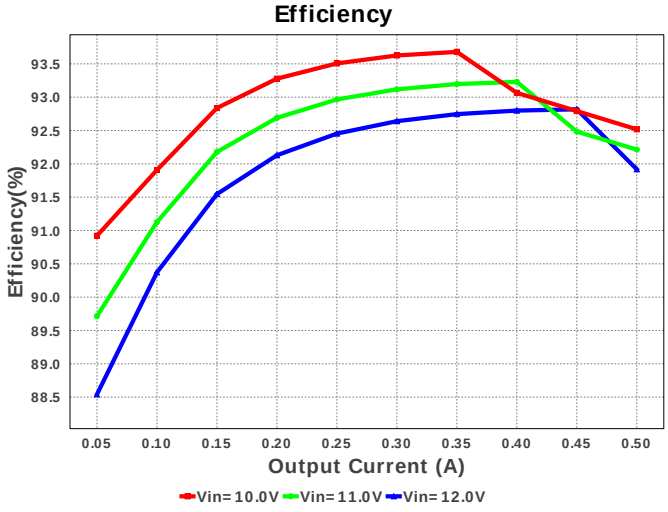
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cff	TDK	C0603C0G1E820K030BA Series= C0G/NP0	Cap= 82.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
3.	Cin	MuRata	GRM31CR61E106KA12L Series= X5R	Cap= 10.0 uF ESR= 4.512 mOhm VDC= 25.0 V IRMS= 2.447 A	1	$0.05	1206_190 11 mm²
4.	Cout	TDK	C4532X5R1E226M Series= X5R	Cap= 22.0 uF ESR= 2.197 mOhm VDC= 25.0 V IRMS= 0.0 A	2	$0.50	1812 23 mm²
5.	L1	Coilcraft	ME3220-822MLB	L= 8.2 µH DCR= 261.0 mOhm	1	$0.23	ME3220 16 mm²
6.	Ren	Vishay-Dale	CRCW0402499KFKED Series= CRCW..e3	Res= 499.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
7.	Rfbb	Vishay-Dale	CRCW040213K7FKED Series= CRCW..e3	Res= 13.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	Rfbt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	U1	Texas Instruments	TPS54202HDDCR	Switcher	1	$0.50	DDC0006A_N 10 mm²

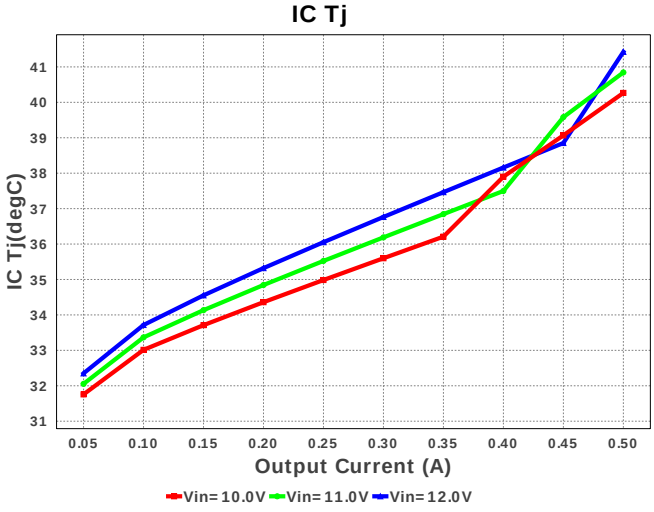


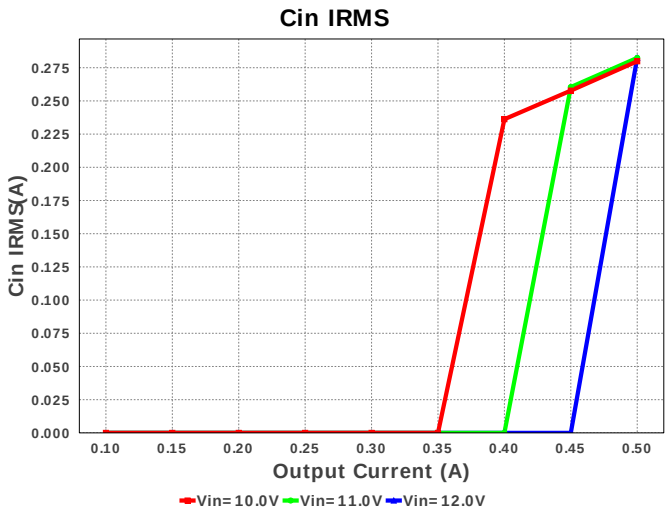


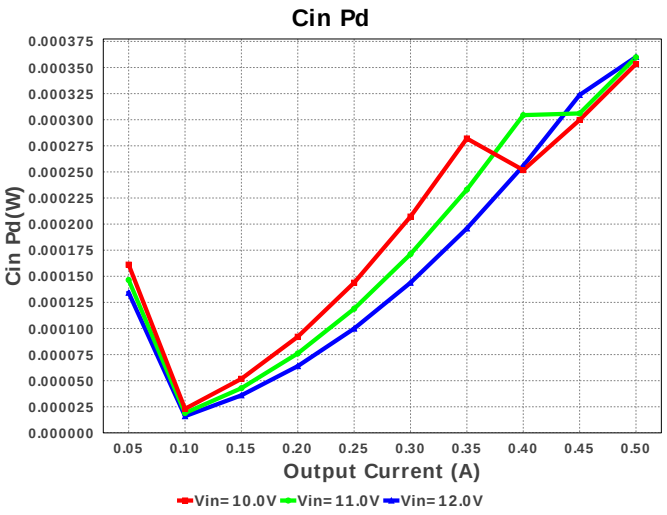


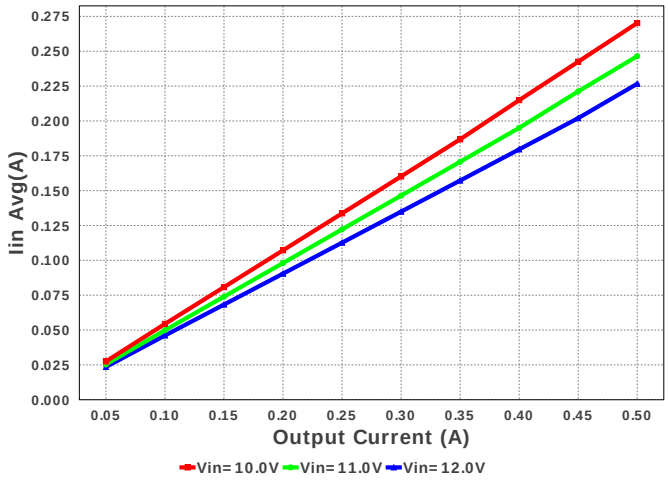


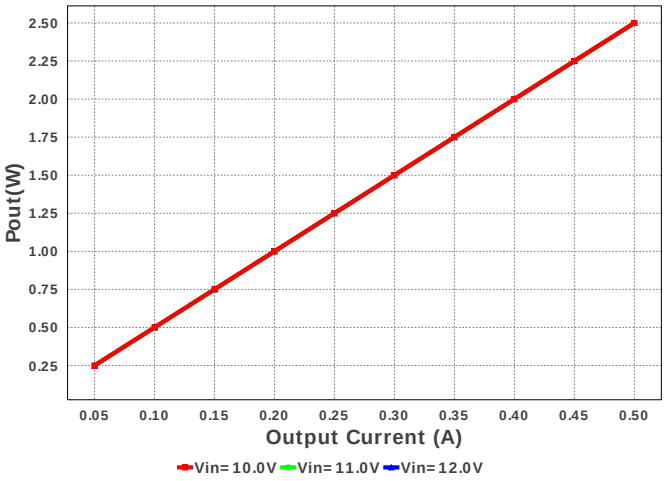


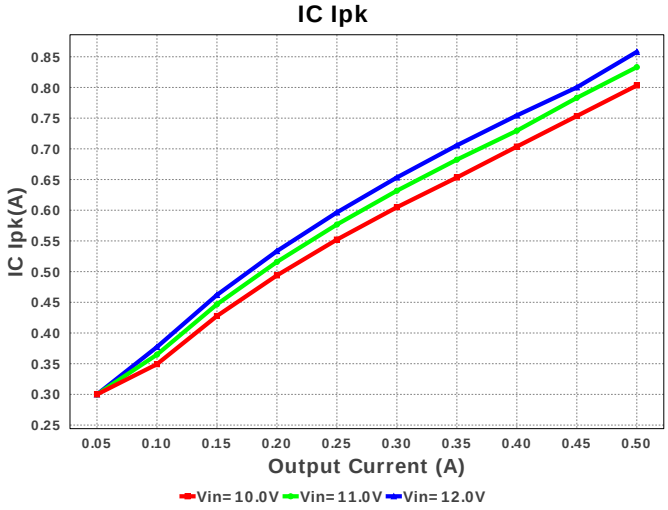


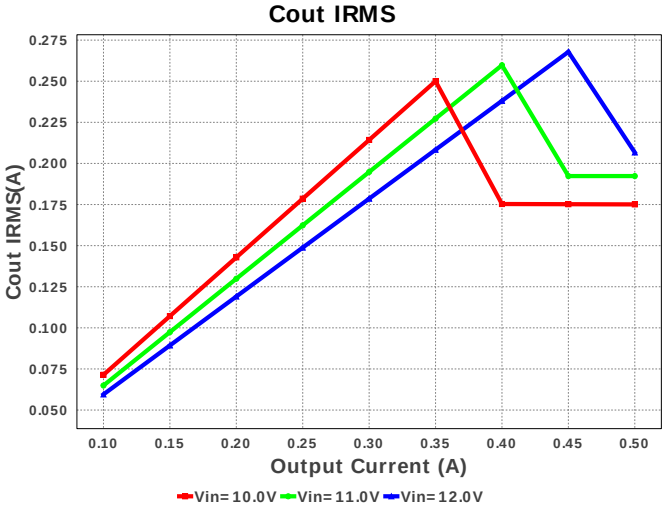


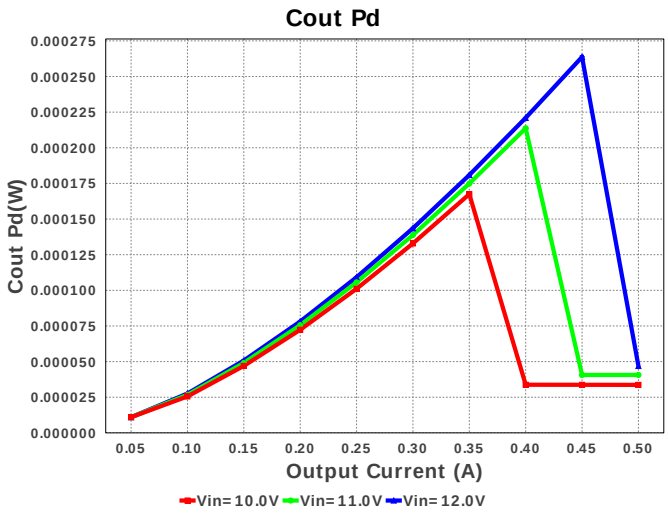


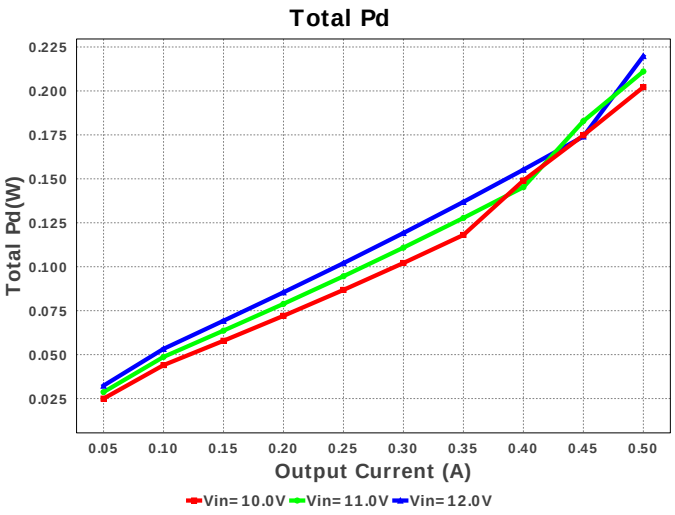


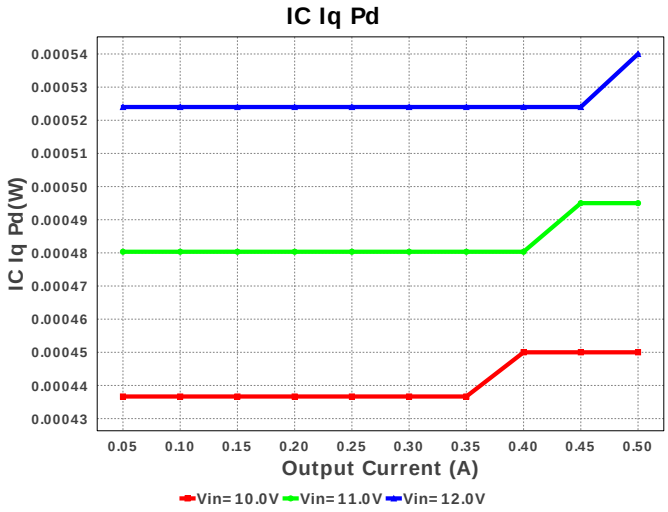


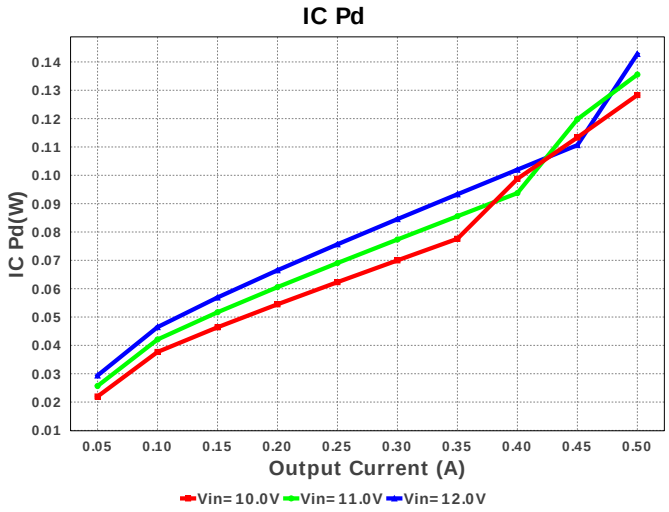


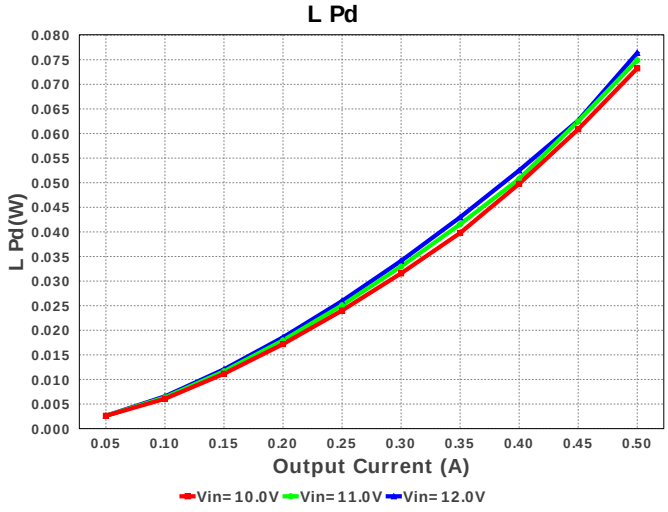


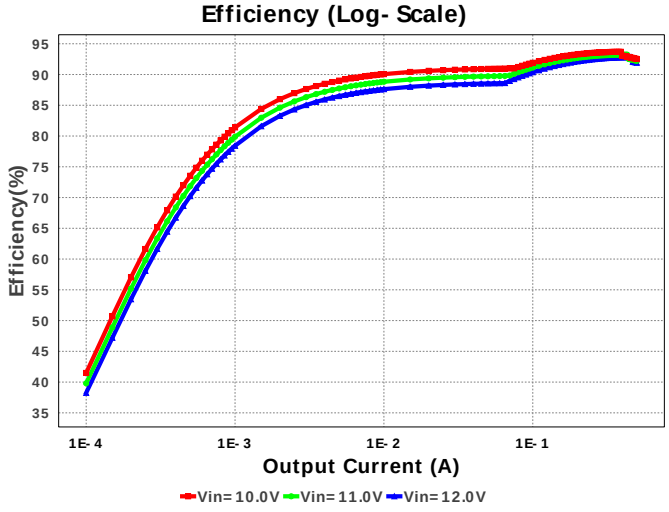












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	282.521 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	206.674 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	857.97 mA	Current	Peak switch current in IC
4.	Iin Avg	226.65 mA	Current	Average input current
5.	L Ipp	715.94 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	10	General	Total Design BOM count
7.	FootPrint	101.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	500.0 kHz	General	Switching frequency
9.	Pout	2.5 W	General	Total output power
10.	Total BOM	$1.83	General	Total BOM Cost
11.	ICThetaJA Effective	80.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance

#	Name	Value	Category	Description
12.	Vout Actual	4.98 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Duty Cycle	43.228 %	Op_point	Duty cycle
14.	Efficiency	91.918 %	Op_point	Steady state efficiency
15.	IC Tj	41.424 degC	Op_point	IC junction temperature
16.	IOUT_OP	500.0 mA	Op_point	Iout operating point
17.	VIN_OP	12.0 V	Op_point	Vin operating point
18.	Vout p-p	4.21 mV	Op_point	Peak-to-peak output ripple voltage
19.	Cin Pd	360.138 µW	Power	Input capacitor power dissipation
20.	Cout Pd	46.921 µW	Power	Output capacitor power dissipation
21.	IC Iq Pd	540.0 µW	Power	IC Iq Pd
22.	IC Pd	142.803 mW	Power	IC power dissipation
23.	L Pd	76.398 mW	Power	Inductor power dissipation
24.	Total Pd	219.814 mW	Power	Total Power Dissipation
25.	Vout Tolerance	1.777 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 m	Maximum Output Current
2.	VinMax	12.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS54202H	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54202H** Product Folder : http://www.ti.com/product/TPS54202H : contains the data sheet and other resources.