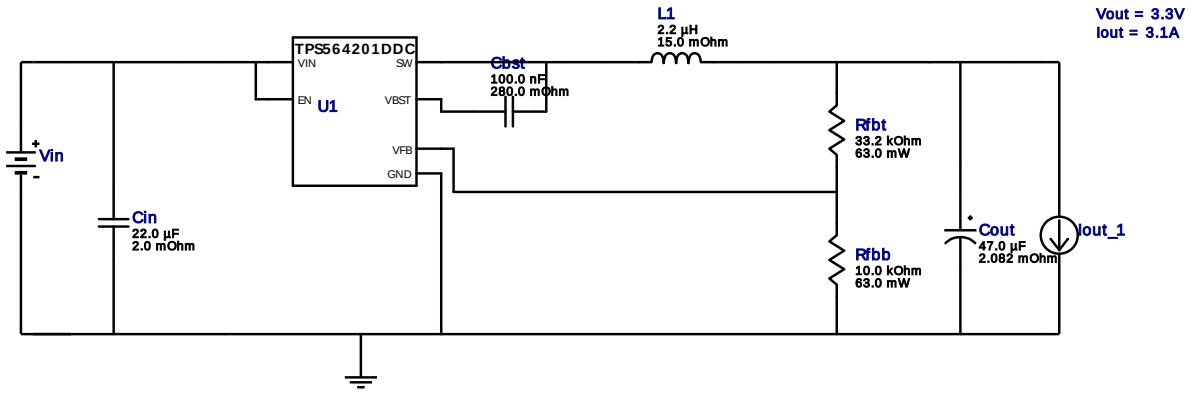
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 14.4V
Vout = 3.3V
Iout = 3.1A

Device = TPS564201DDCR
Topology = Buck
Created = 7/11/16 4:17:47 AM
BOM Cost = $1.26
BOM Count = 7
Total Pd = 1.09W

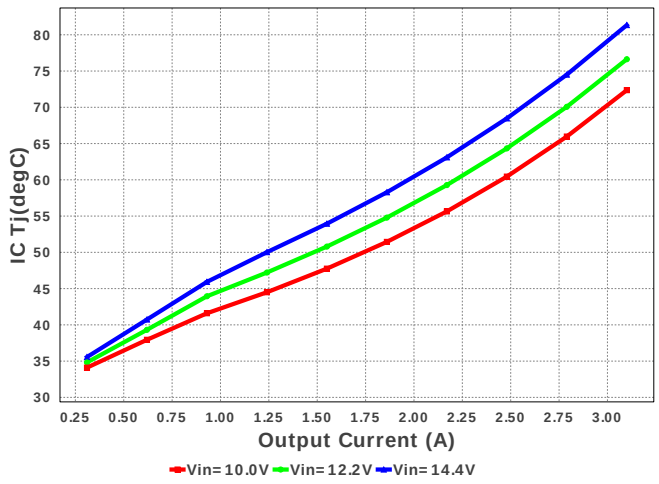
Design : 1641152/97 TPS564201DDCR
TPS564201DDCR 10.0V-14.4V to 3.30V @ 3.1A



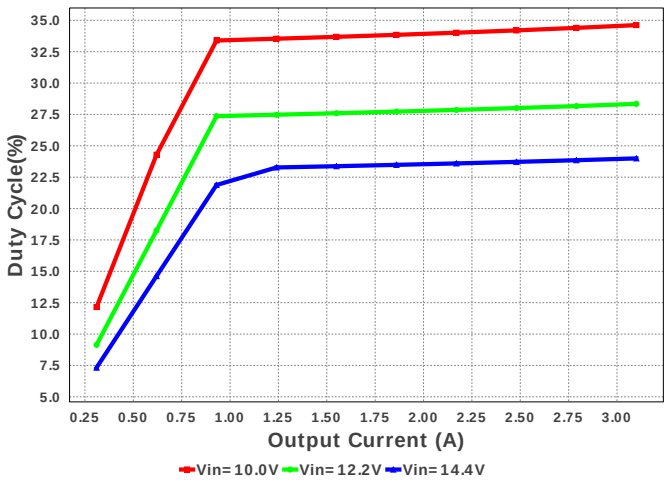
Electrical BOM

#	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.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	$0.16	1210 15 mm²
3.	Cout	TDK	C3216X5R1E476M160AC Series= X5R	Cap= 47.0 uF ESR= 2.082 mOhm VDC= 25.0 V IRMS= 5.0279 A	1	$0.35	1206 11 mm²
4.	L1	TDK	VLP8040T-2R2N	L= 2.2 µH DCR= 15.0 mOhm	1	$0.22	VLP8040 113 mm²
5.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
6.	Rfbt	Vishay-Dale	CRCW040233K2FKED Series= CRCW..e3	Res= 33.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
7.	U1	Texas Instruments	TPS564201DDCR	Switcher	1	$0.50	DDC0006A_N 10 mm²

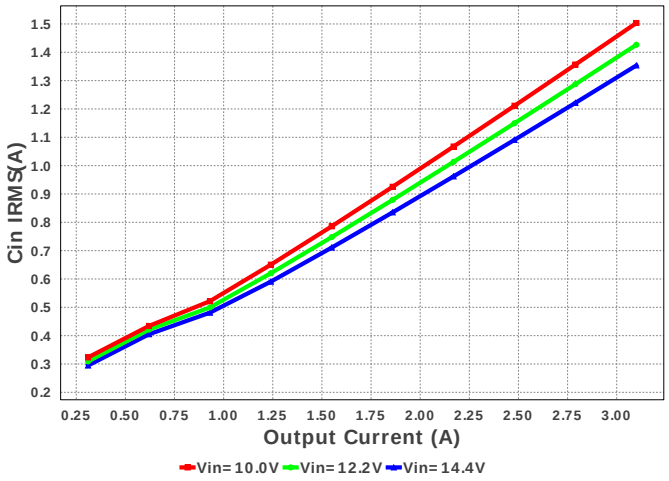
IC Tj



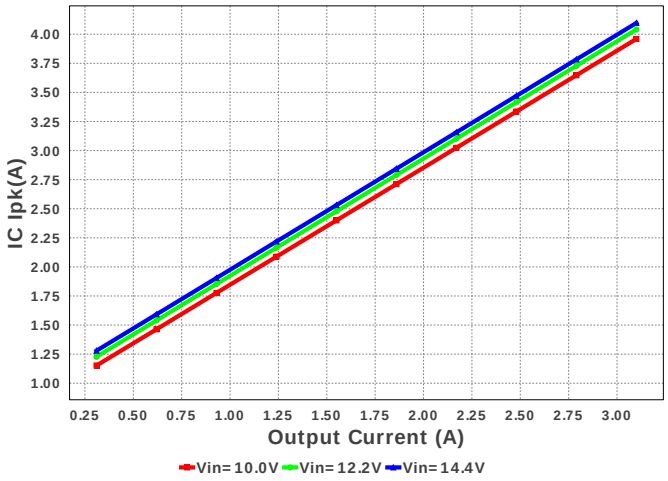
Duty Cycle



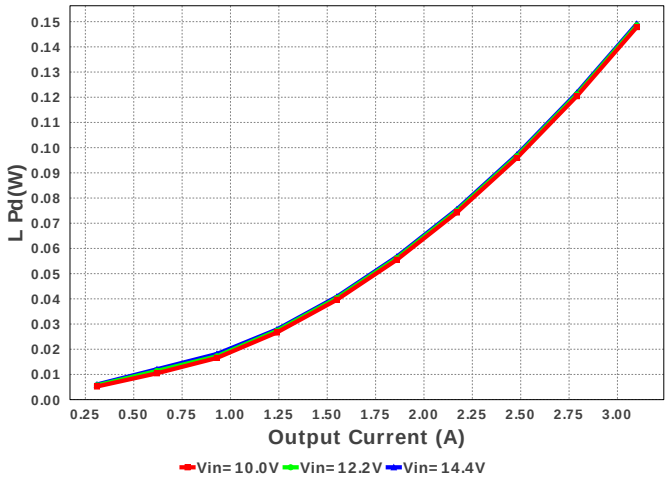
Cin IRMS



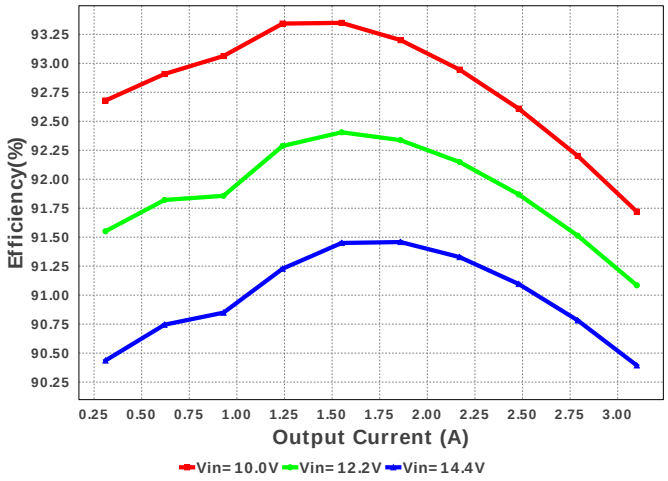
IC Ipk

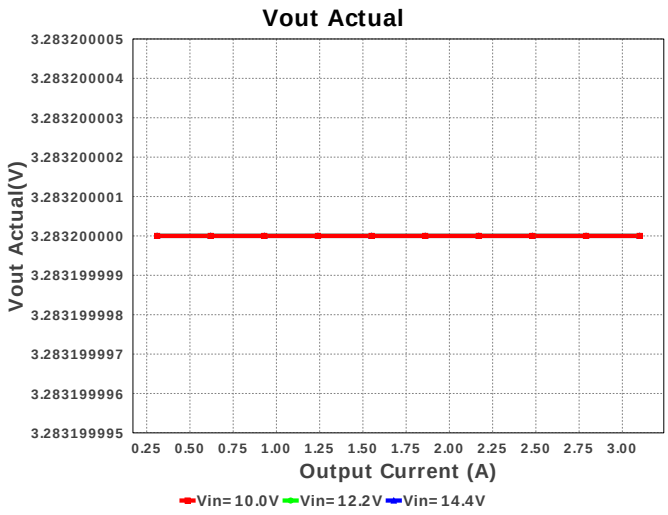


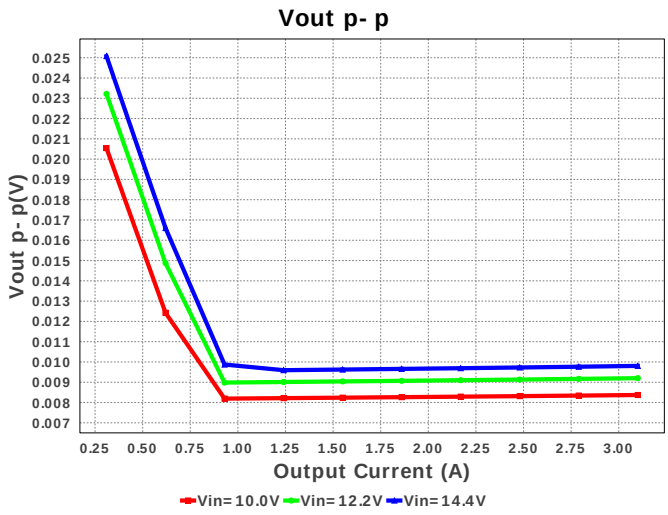
L Pd

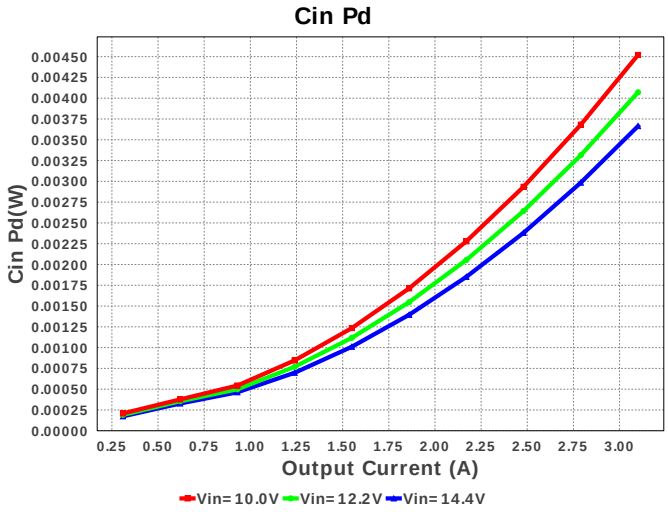


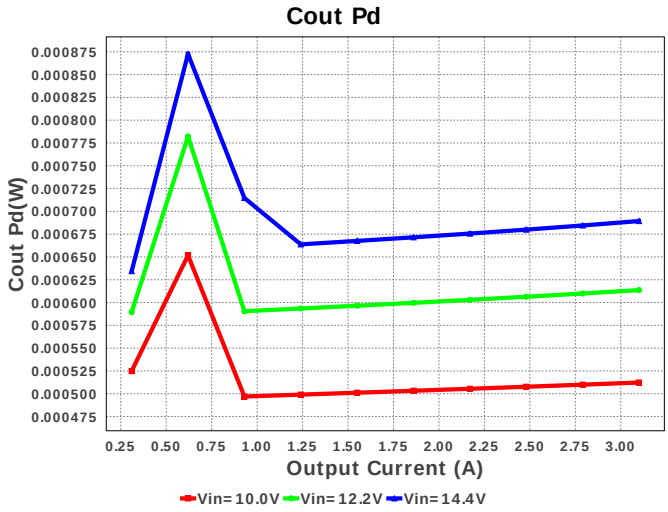
Efficiency

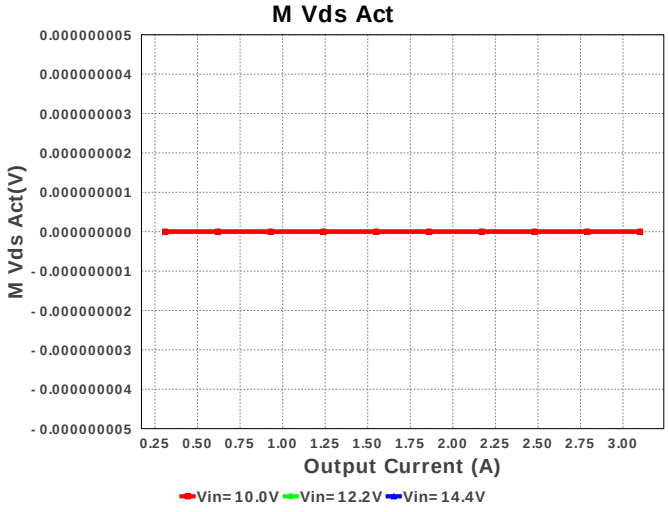


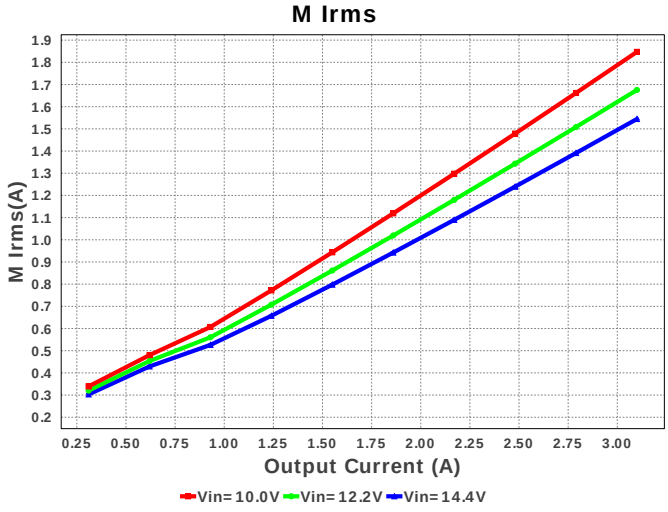


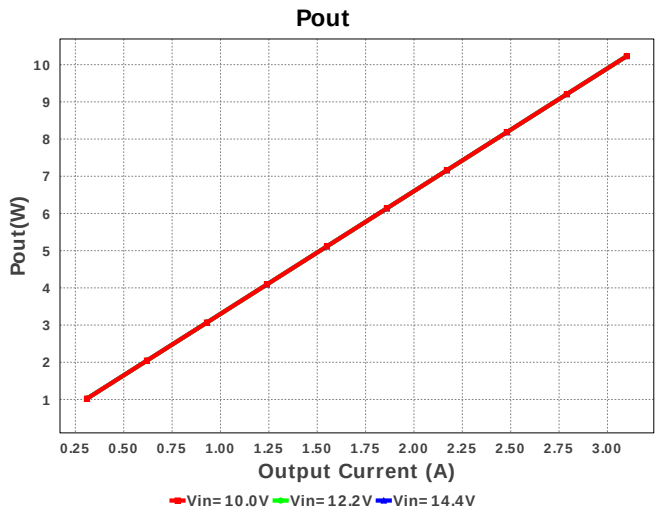


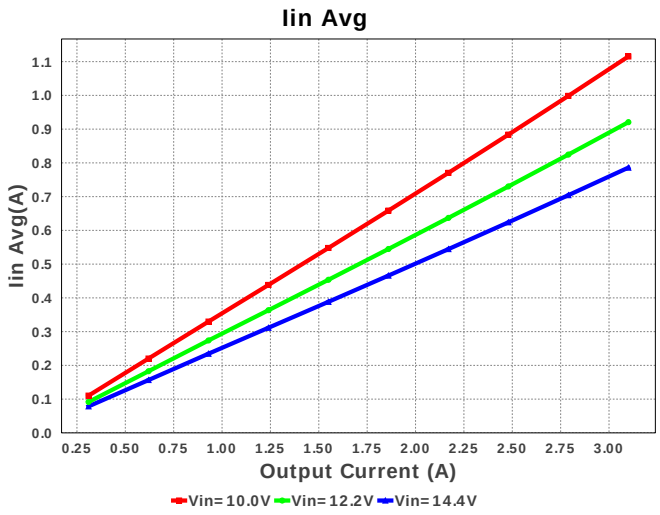


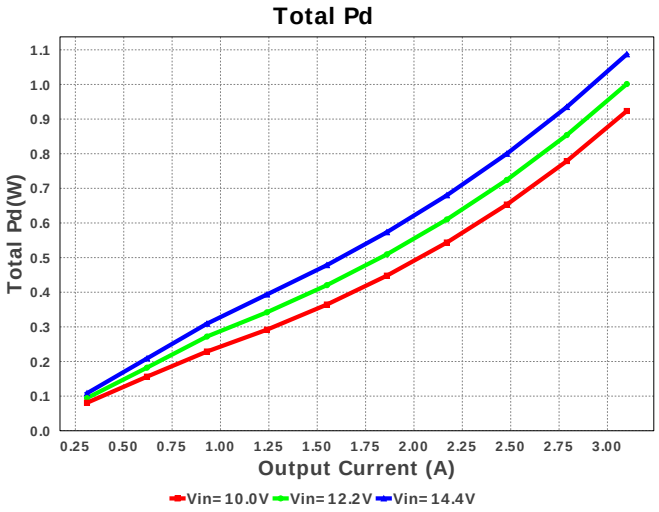


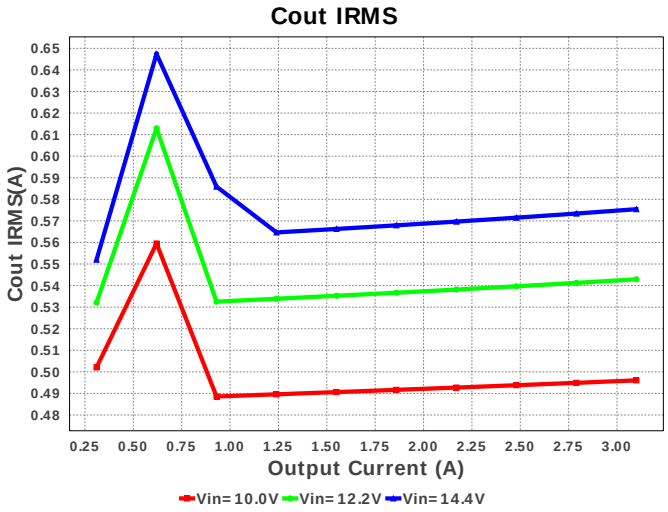


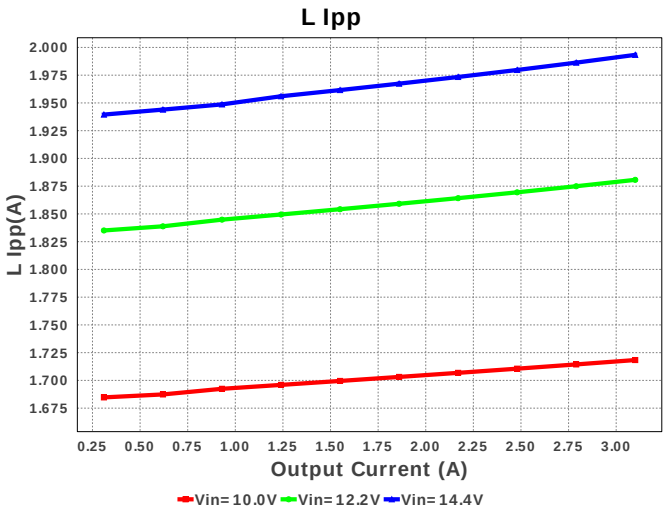


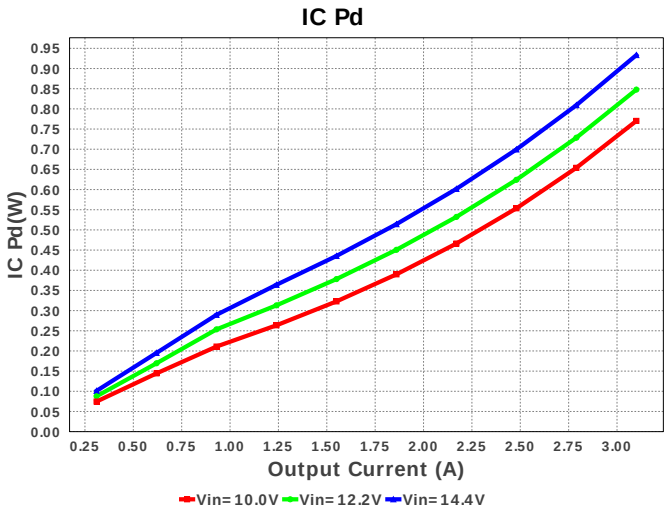












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.354 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	575.416 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	4.097 A	Current	Peak switch current in IC
4.	Iin Avg	785.91 mA	Current	Average input current
5.	L Ipp	1.993 A	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.545 A	Current	Q Iavg
7.	BOM Count	7	General	Total Design BOM count
8.	FootPrint	162.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	592.99 kHz	General	Switching frequency
10.	IC Tolerance	10.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	0.0 V	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	10.23 W	General	Total output power
13.	Total BOM	$1.26	General	Total BOM Cost
14.	Vout Actual	3.283 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	23.997 %	Op_point	Duty cycle
17.	Efficiency	90.394 %	Op_point	Steady state efficiency
18.	IC Tj	81.335 degC	Op_point	IC junction temperature
19.	ICThetaJA	55.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	3.1 A	Op_point	Iout operating point
21.	VIN_OP	14.4 V	Op_point	Vin operating point
22.	Vout p-p	9.806 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	3.664 mW	Power	Input capacitor power dissipation
24.	Cout Pd	689.358 µW	Power	Output capacitor power dissipation
25.	IC Pd	933.366 mW	Power	IC power dissipation
26.	L Pd	149.117 mW	Power	Inductor power dissipation
27.	Total Pd	1.087 W	Power	Total Power Dissipation
28.	Vout Tolerance	2.889 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	3.1	Maximum Output Current
2.	VinMax	14.4	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS564201	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS564201** Product Folder : http://www.ti.com/product/TPS564201 : contains the data sheet and other resources.