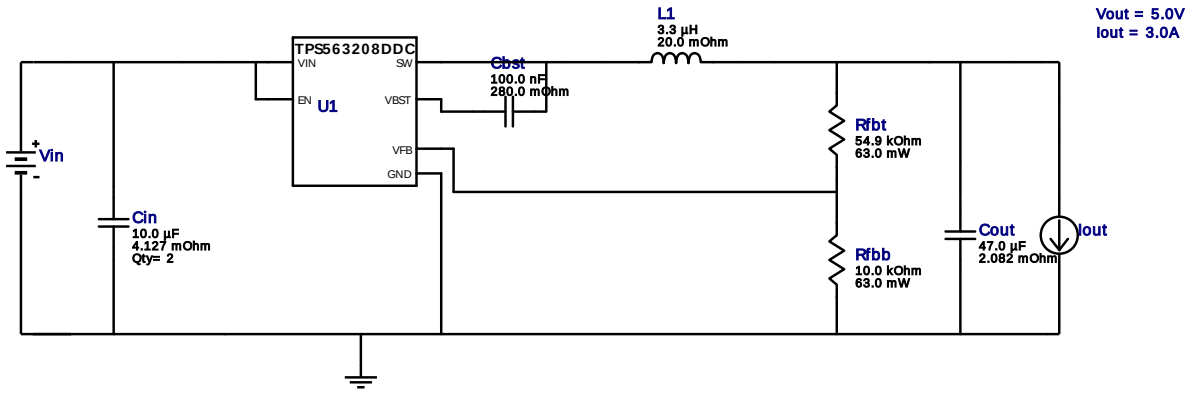
WEBENCH® Design Report

VinMin = 9.0V
VinMax = 12.0V
Vout = 5.0V
Iout = 3.0A

Device = TPS563208DDCR
Topology = Buck
Created = 4/10/17 12:04:07 PM
BOM Cost = $1.13
BOM Count = 8
Total Pd = 1.46W

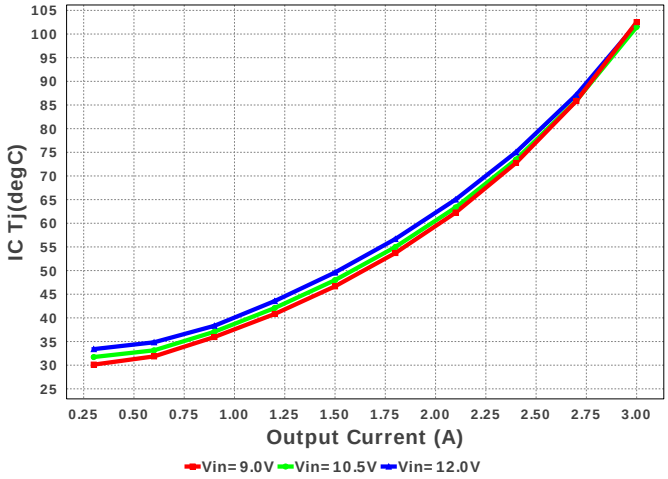
Design : 1232609/2 TPS563208DDCR
TPS563208DDCR 9.0V-12.0V to 5.00V @ 3.0A



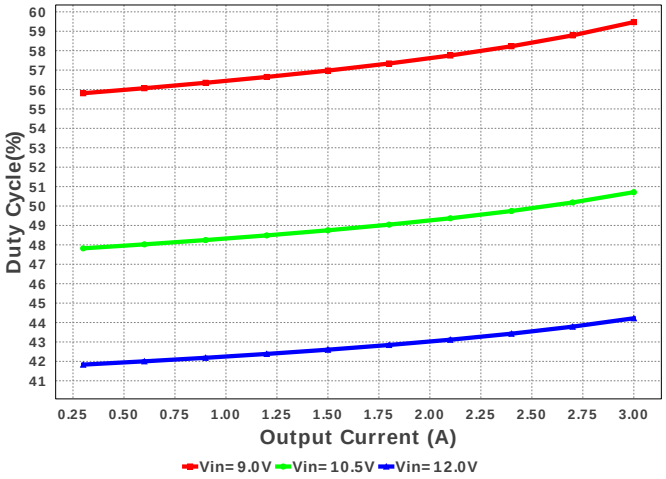
Electrical BOM

#	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	GRM21BR61C106KE15L Series= X5R	Cap= 10.0 uF ESR= 4.127 mOhm VDC= 16.0 V IRMS= 2.46634 A	2	$0.03	0805 7 mm²
3.	Cout	TDK	C3216X5R1E476M160AC Series= X5R	Cap= 47.0 uF ESR= 2.082 mOhm VDC= 25.0 V IRMS= 5.0279 A	1	$0.37	1206 11 mm²
4.	L1	TDK	VLP8040T-3R3N	L= 3.3 µH DCR= 20.0 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	CRCW040254K9FKED Series= CRCW..e3	Res= 54.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
7.	U1	Texas Instruments	TPS563208DDCR	Switcher	1	$0.45	DDC0006A_N 10 mm²

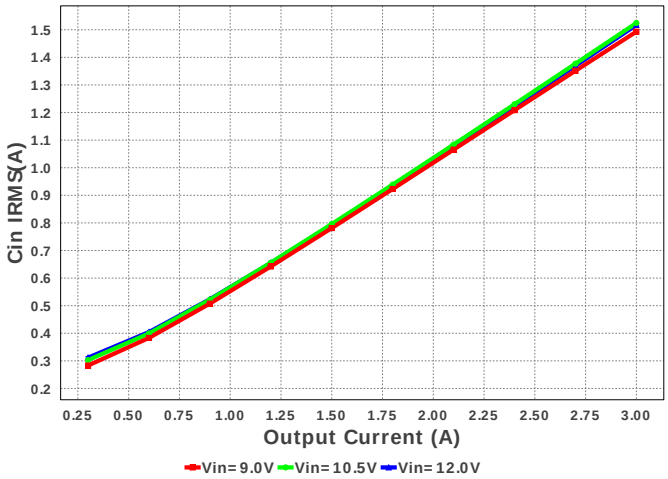
IC Tj



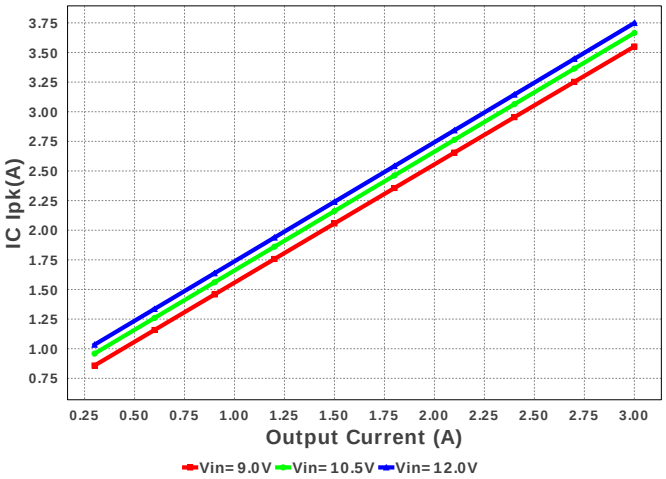
Duty Cycle



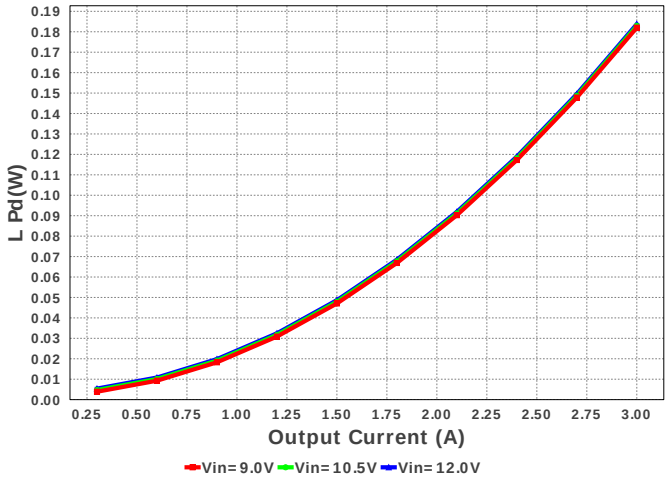
Cin IRMS



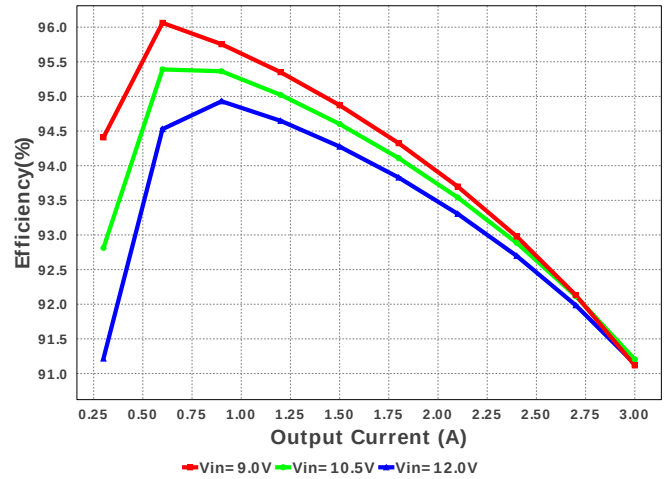
IC Ipk

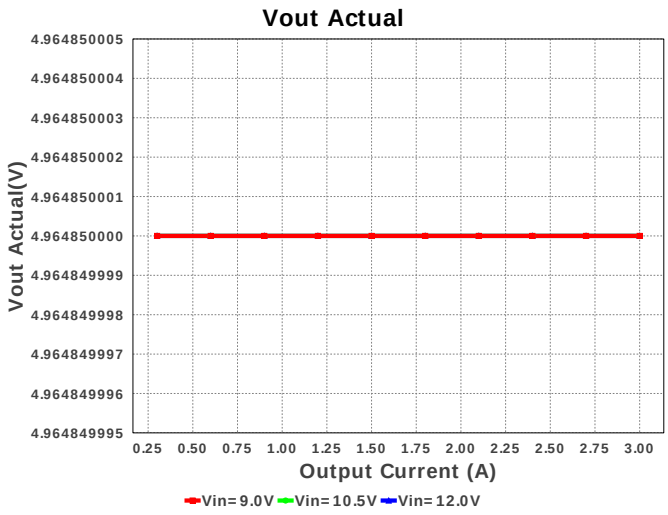


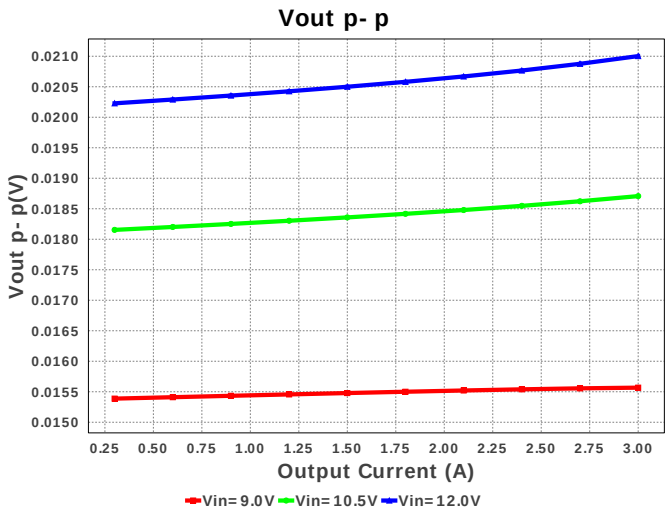
L Pd

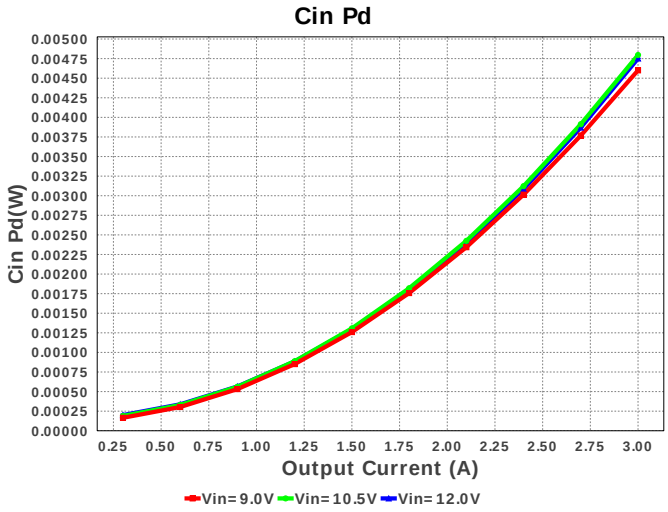


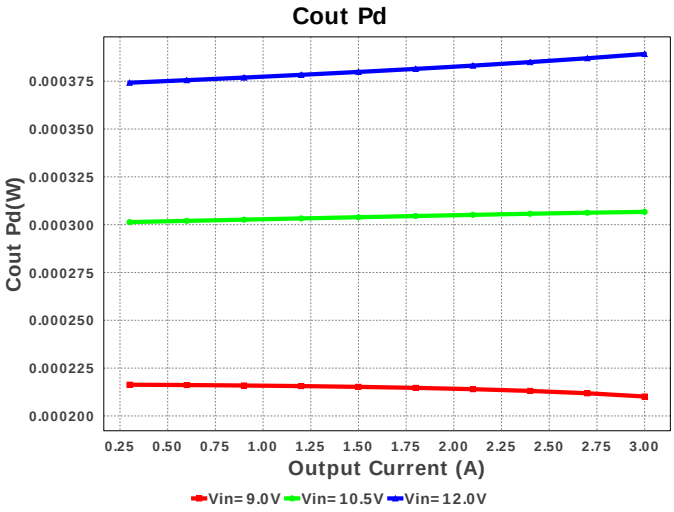
Efficiency

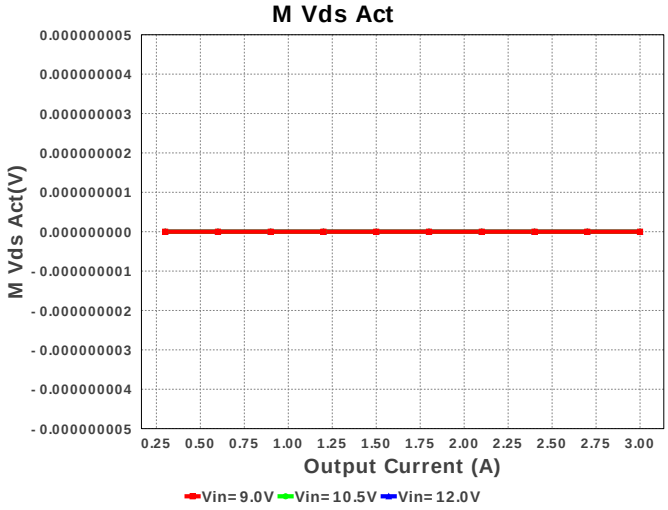


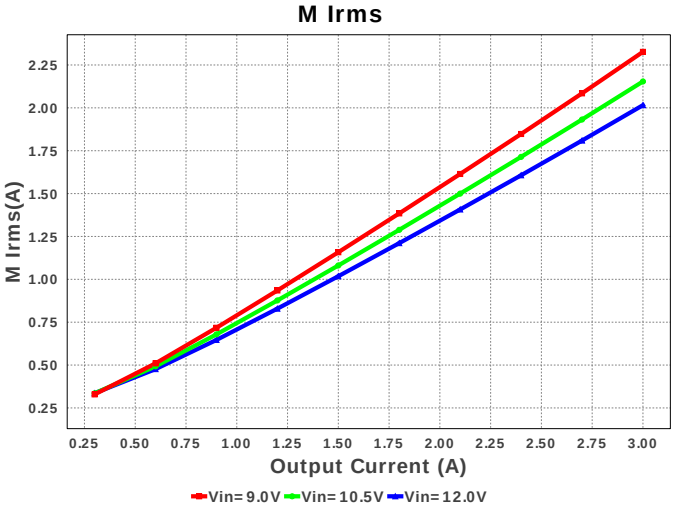


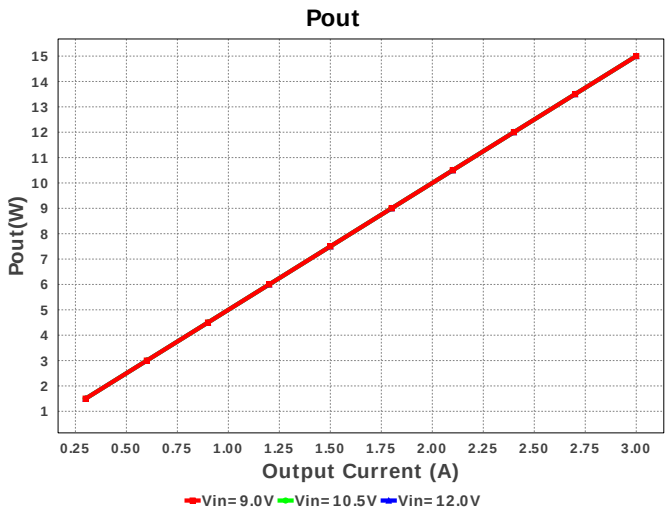


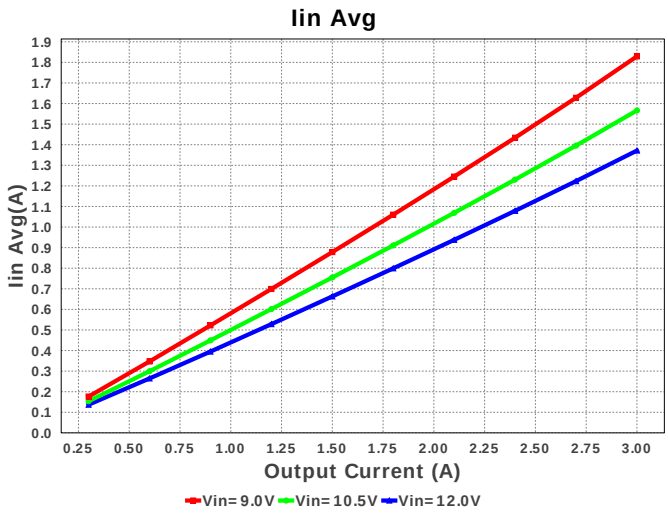


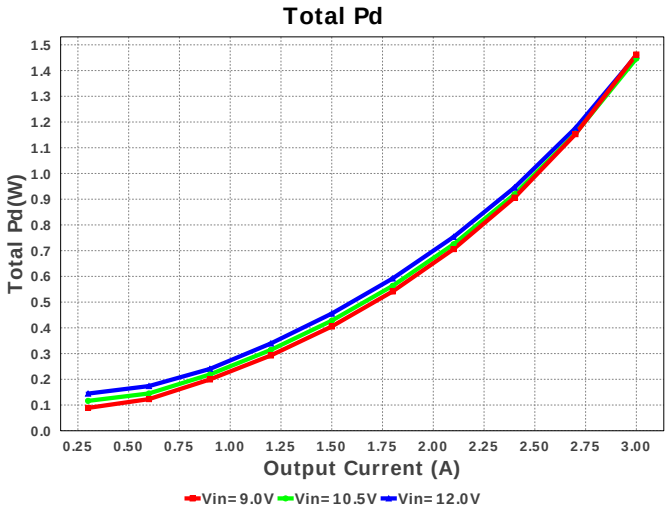


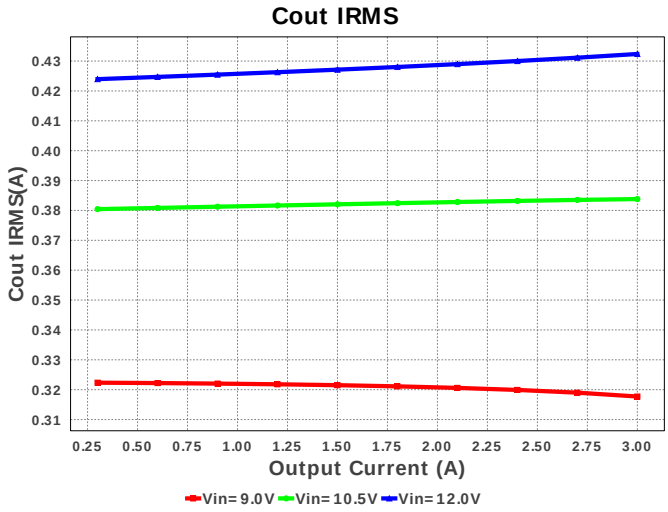


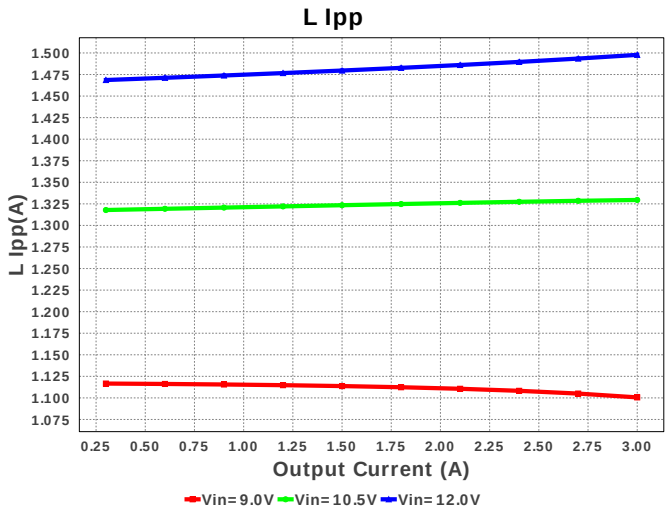


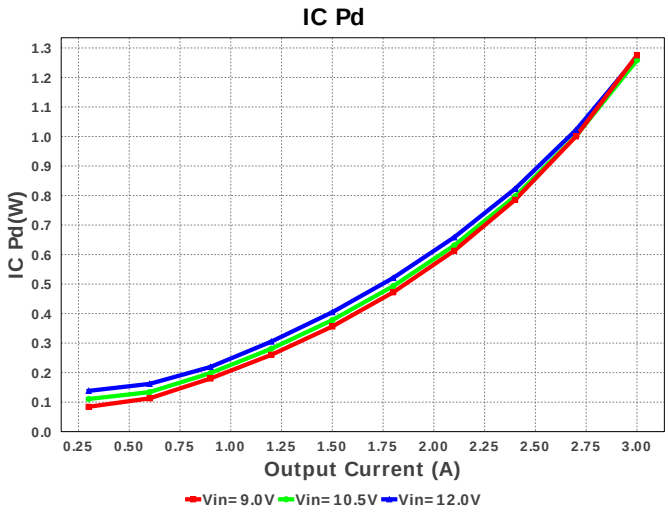












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.517 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	432.371 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	3.749 A	Current	Peak switch current in IC
4.	Iin Avg	1.372 A	Current	Average input current
5.	L Ipp	1.498 A	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	2.016 A	Current	Q Iavg
7.	BOM Count	8	General	Total Design BOM count
8.	FootPrint	161.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	591.235 kHz	General	Switching frequency
10.	IC Tolerance	19.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	0.0 V	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Mode	CCM	General	Conduction Mode
13.	Pout	15.0 W	General	Total output power
14.	Total BOM	$1.13	General	Total BOM Cost
15.	Vout Actual	4.965 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	44.22 %	Op_point	Duty cycle
18.	Efficiency	91.139 %	Op_point	Steady state efficiency
19.	IC Tj	102.159 degC	Op_point	IC junction temperature
20.	ICThetaJA	60.8 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	3.0 A	Op_point	Iout operating point
22.	VIN_OP	12.0 V	Op_point	Vin operating point
23.	Vout p-p	21.003 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	4.751 mW	Power	Input capacitor power dissipation
25.	Cout Pd	389.218 µW	Power	Output capacitor power dissipation
26.	IC Pd	1.269 W	Power	IC power dissipation
27.	L Pd	183.739 mW	Power	Inductor power dissipation
28.	Total Pd	1.458 W	Power	Total Power Dissipation
29.	Vout Tolerance	4.235 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	3.0	Maximum Output Current
2.	VinMax	12.0	Maximum input voltage
3.	VinMin	9.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS563208	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	25.0	Ambient temperature

Design Assistance

1. **TPS563208** Product Folder : http://www.ti.com/product/TPS563208 : contains the data sheet and other resources.