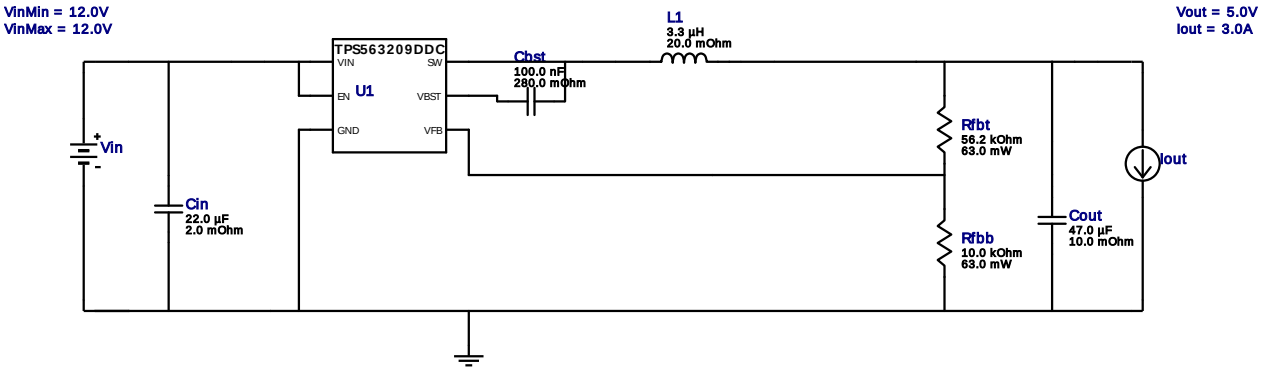
WEBENCH® Design Report

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

Device = TPS563209DDCR
Topology = Buck
Created = 5/22/15 4:43:21 AM
BOM Cost = $1.14
Footprint = 162.0 mm^2
BOM Count = 7
Total Pd = 0.98W

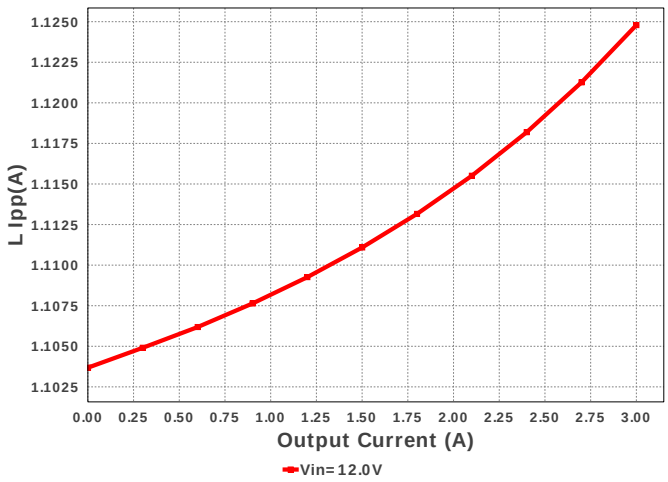
Design : 3514097/26 TPS563209DDCR
TPS563209DDCR 12.0V-12.0V to 5.00V @ 3.0A



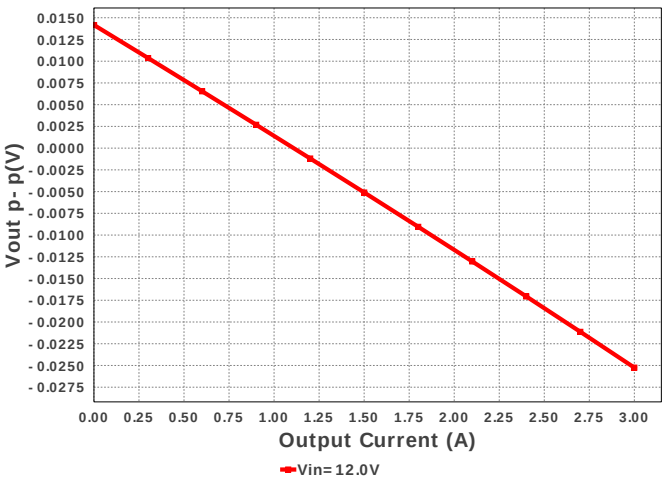
Electrical BOM

#	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 mm^2
2.	Cin	MuRata	GRM32ER61C226KE20L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	1	$0.16	1210 15 mm^2
3.	Cout	MuRata	GRM31CR61A476KE15L Series= X5R	Cap= 47.0 uF ESR= 10.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.21	1206 11 mm^2
4.	L1	TDK	VLP8040T-3R3N	L= 3.3 µH DCR= 20.0 mOhm	1	$0.22	VLP8040 113 mm^2
5.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
6.	Rfbt	Vishay-Dale	CRCW040256K2FKED Series= CRCW..e3	Res= 56.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
7.	U1	Texas Instruments	TPS563209DDCR	Switcher	1	$0.52	DDC0006A 10 mm^2

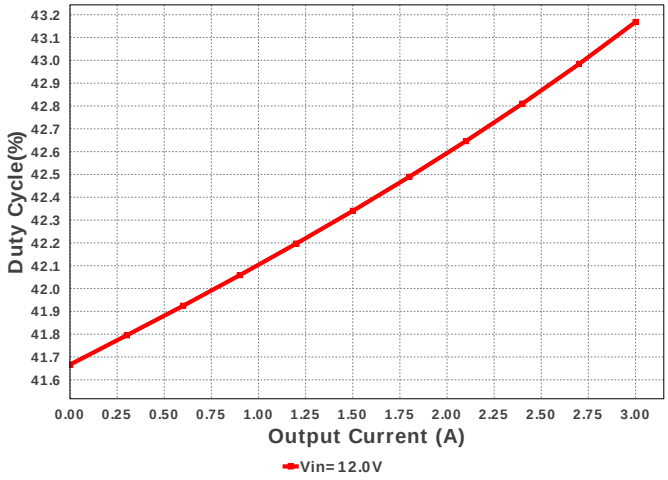
L Ipp



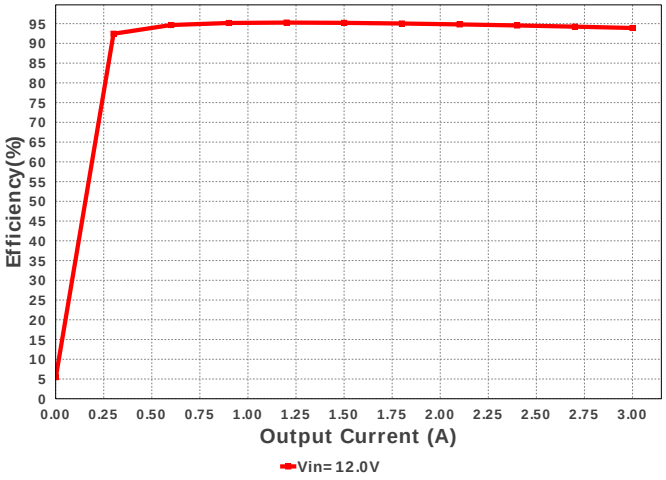
Vout p- p



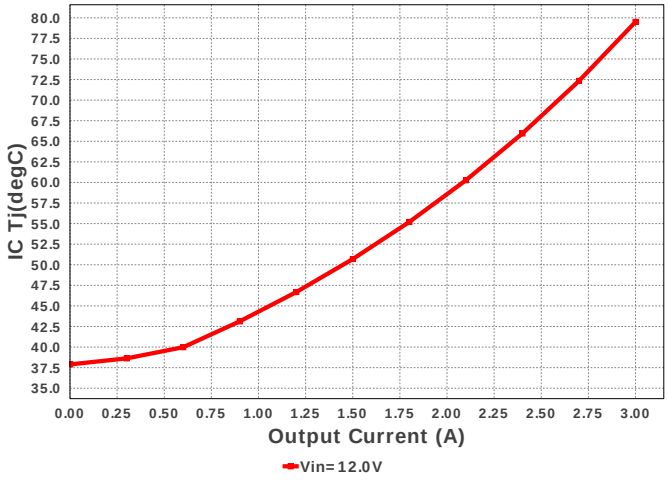
Duty Cycle



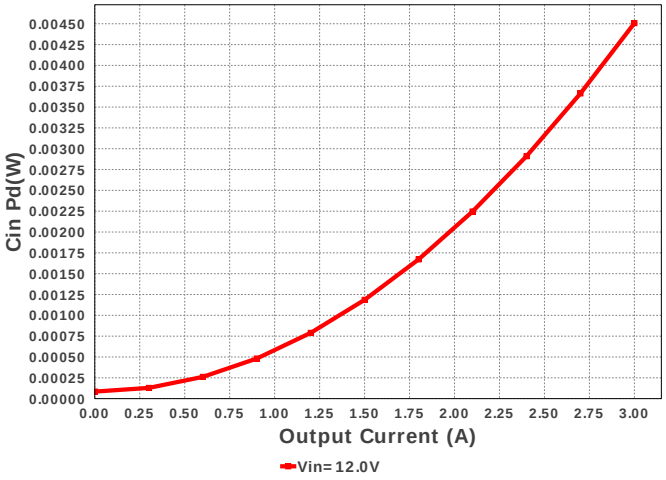
Efficiency

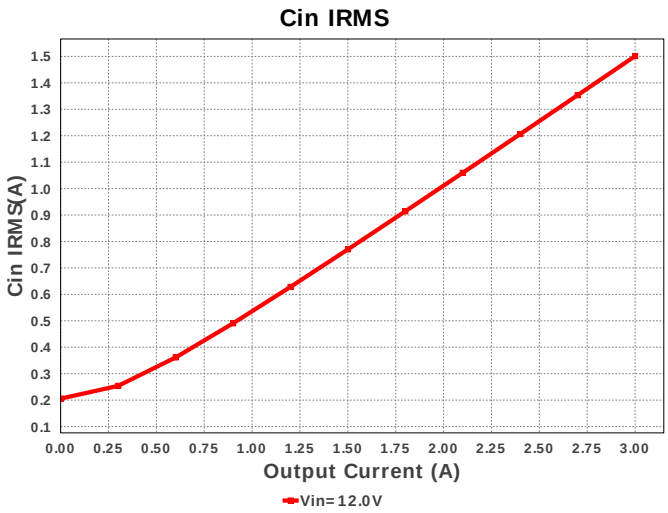


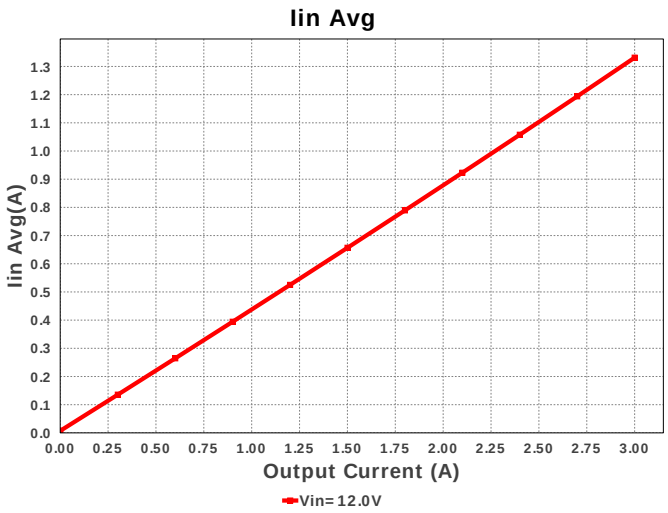
IC Tj

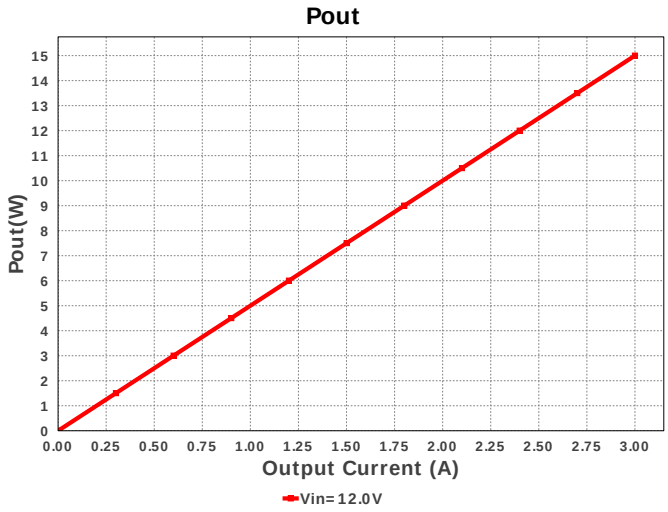


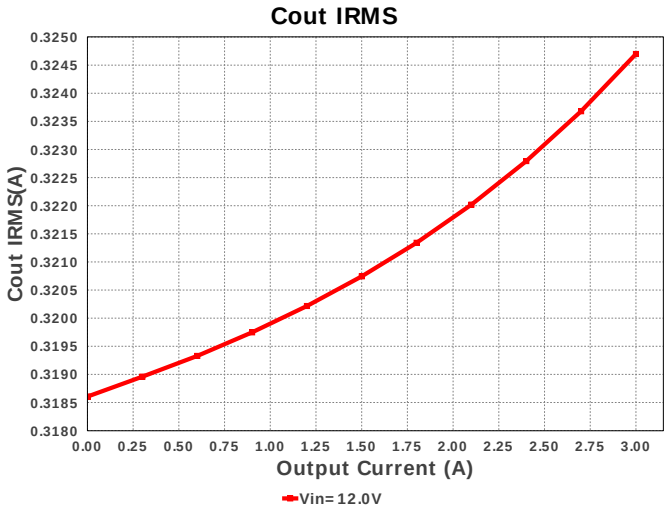
Cin Pd

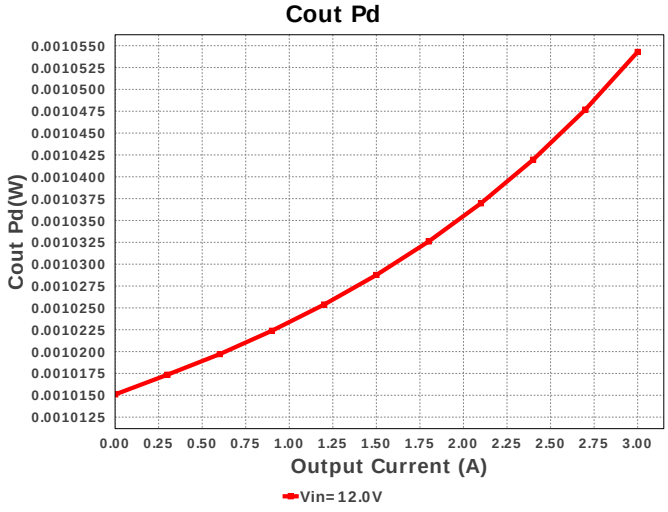


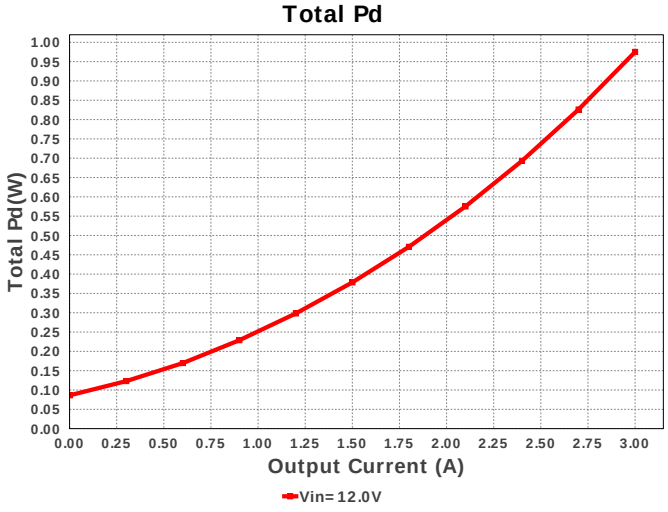


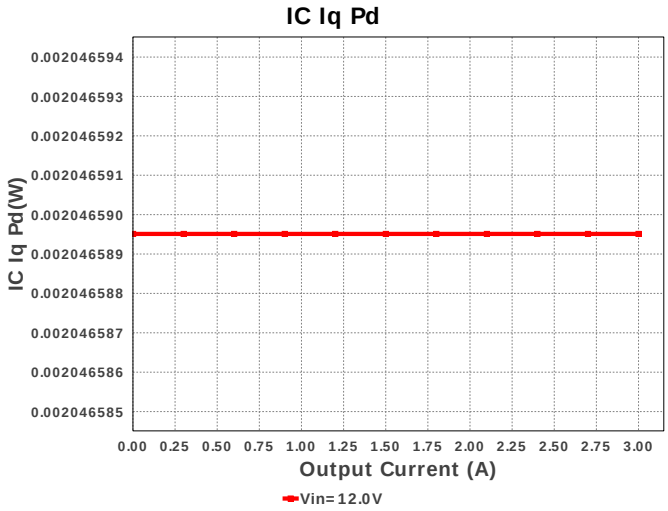


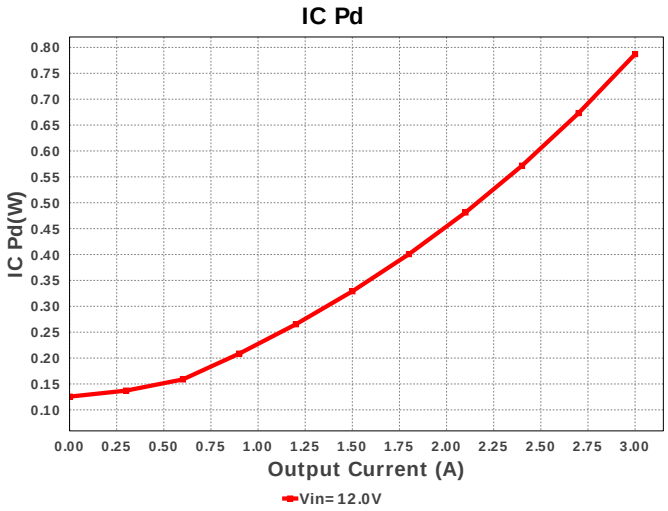


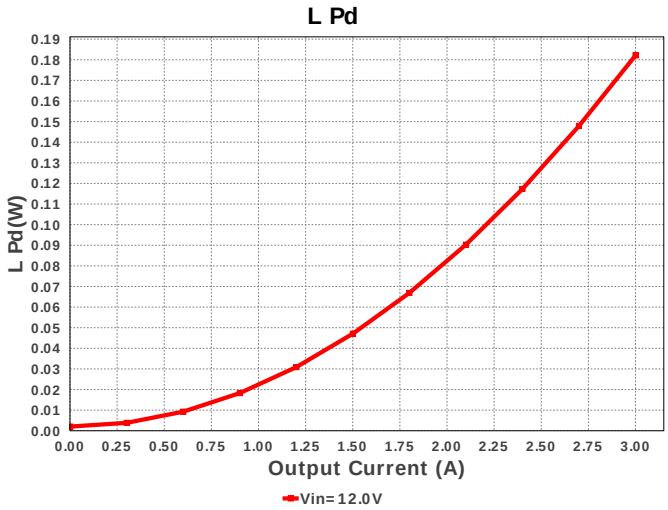












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.501 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	324.699 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.331 A	Current	Average input current
4.	L Ipp	1.125 A	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	162.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	790.897 kHz	General	Switching frequency
8.	Pout	15.0 W	General	Total output power
9.	Total BOM	$1.14	General	Total BOM Cost
10.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
11.	Duty Cycle	43.168 %	Op_point	Duty cycle
12.	Efficiency	93.896 %	Op_point	Steady state efficiency
13.	IC Tj	79.507 degC	Op_point	IC junction temperature
14.	ICThetaJA	62.9 degC/W	Op_point	IC junction-to-ambient thermal resistance
15.	IOUT_OP	3.0 A	Op_point	Iout operating point
16.	VIN_OP	12.0 V	Op_point	Vin operating point
17.	Vout p-p	11.248 mV	Op_point	Peak-to-peak output ripple voltage
18.	Cin Pd	4.507 mW	Power	Input capacitor power dissipation
19.	Cout Pd	1.054 mW	Power	Output capacitor power dissipation
20.	IC Iq Pd	2.047 mW	Power	IC Iq Pd
21.	IC Pd	787.073 mW	Power	IC power dissipation
22.	L Pd	182.109 mW	Power	Inductor power dissipation
23.	Total Pd	975.151 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	3.0	Maximum Output Current
2.	Iout1	3.0	Output Current #1
3.	VinMax	12.0	Maximum input voltage
4.	VinMin	12.0	Minimum input voltage

#	Name	Value	Description
5.	Vout	5.0	Output Voltage
6.	Vout1	5.0	Output Voltage #1
7.	base_pn	TPS563209	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS563209** Product Folder : http://www.ti.com/lit/ds/symlink/tps563209.pdf : contains the data sheet and other resources.