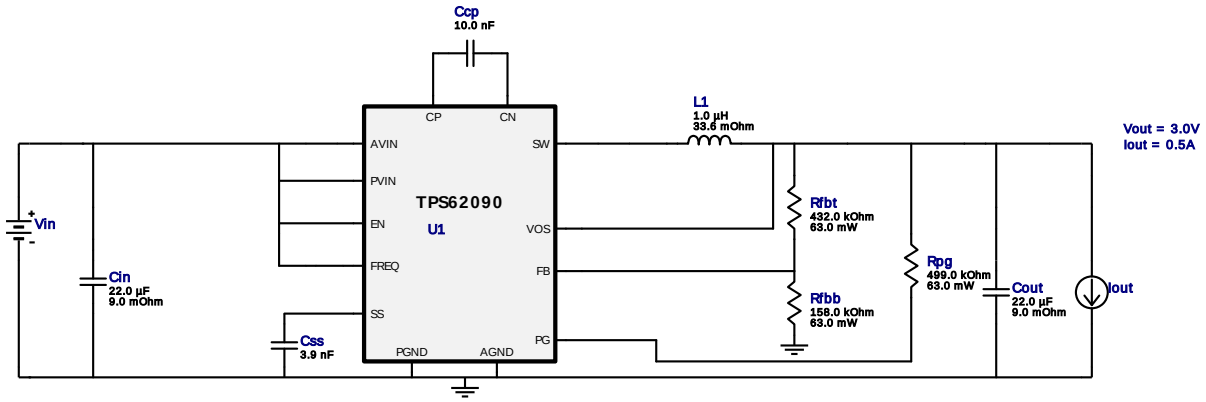
WEBENCH® Design Report

VinMin = 4.5V
VinMax = 5.5V
Vout = 3.0V
Iout = 0.5A

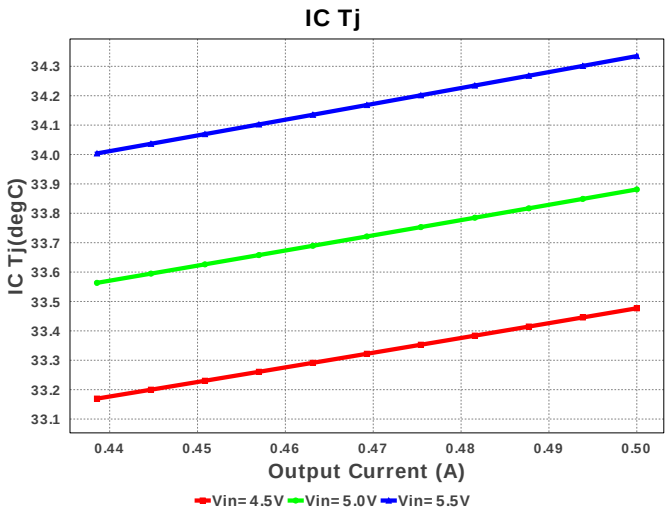
Device = TPS62090RGTR
Topology = Buck
Created = 7/19/16 5:43:47 AM
BOM Cost = $1.49
BOM Count = 9
Total Pd = 0.11W

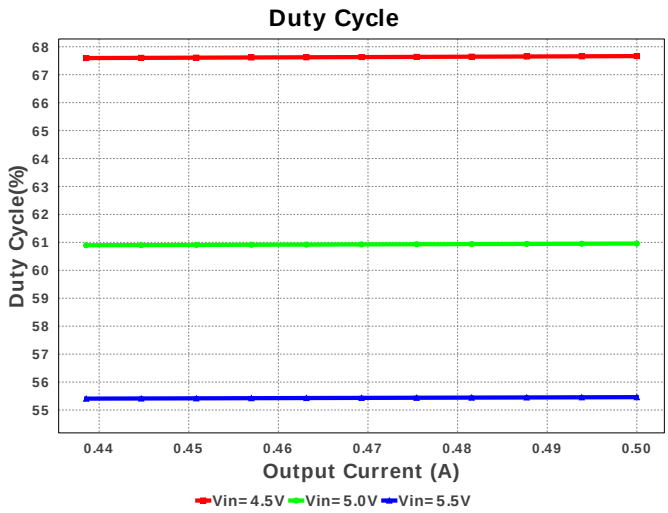
Design : 4742013/144 TPS62090RGTR
TPS62090RGTR 4.5V-5.5V to 3.00V @ 0.5A

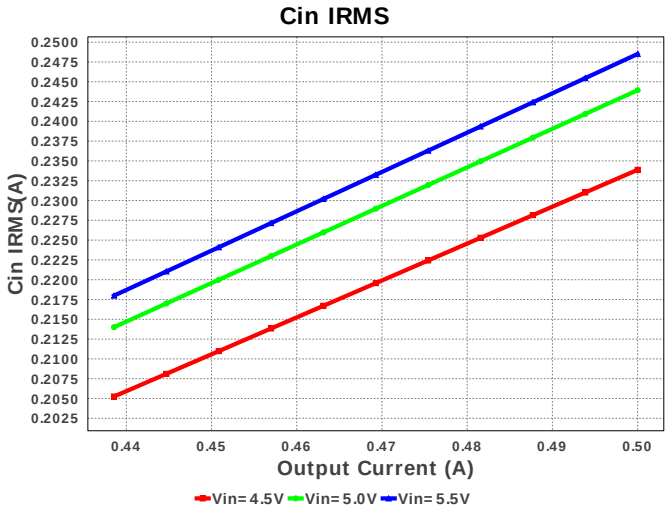


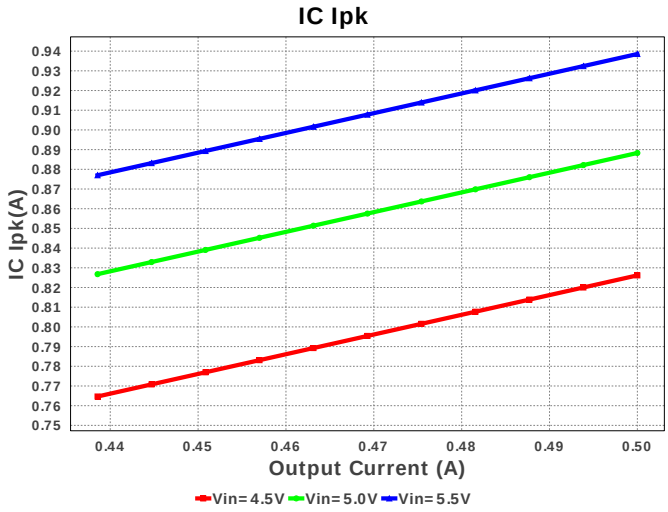
Electrical BOM

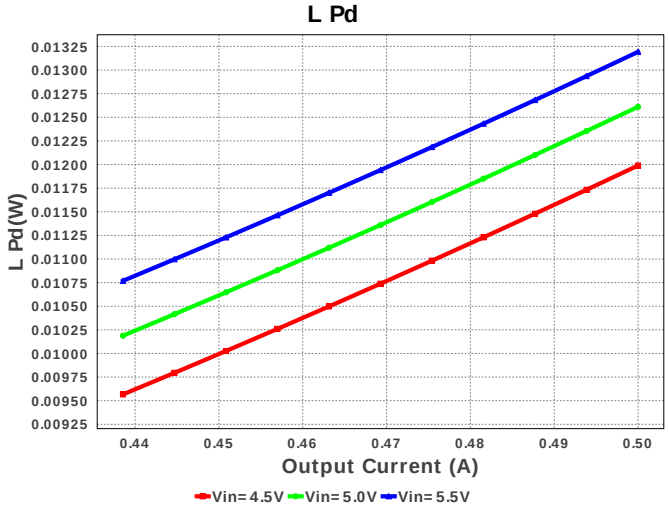
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccp	MuRata	GRM155R71E103KA01D Series= X7R	Cap= 10.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Cin	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	1	$0.04	0805 7 mm²
3.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	1	$0.04	0805 7 mm²
4.	Css	MuRata	GRM033R71A392KA01D Series= X7R	Cap= 3.9 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
5.	L1	Bourns	SRP4012-1R0M	L= 1.0 µH DCR= 33.6 mOhm	1	$0.49	SRP4012 28 mm²
6.	Rfbb	Vishay-Dale	CRCW0402158KFKED Series= CRCW..e3	Res= 158.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
7.	Rfbt	Vishay-Dale	CRCW0402432KFKED Series= CRCW..e3	Res= 432.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	Rpg	Vishay-Dale	CRCW0402499KFKED Series= CRCW..e3	Res= 499.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	U1	Texas Instruments	TPS62090RGTR	Switcher	1	$0.87	S-PVQFN-N16 17 mm²

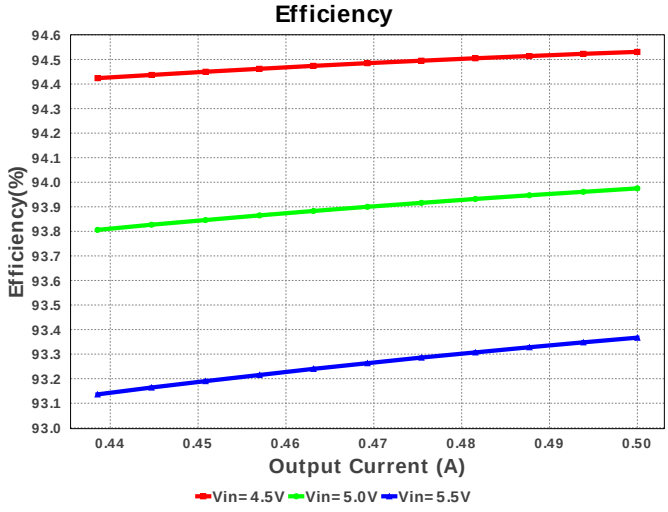


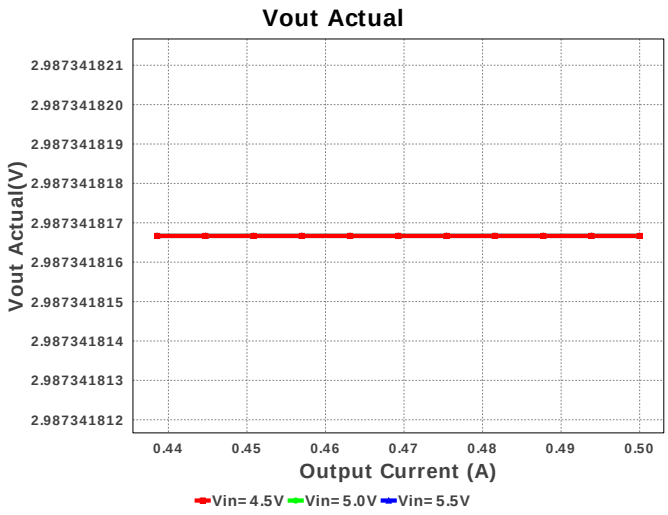


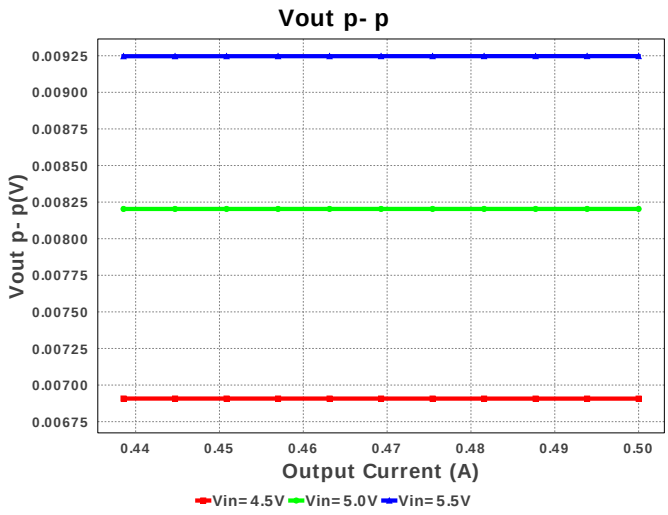


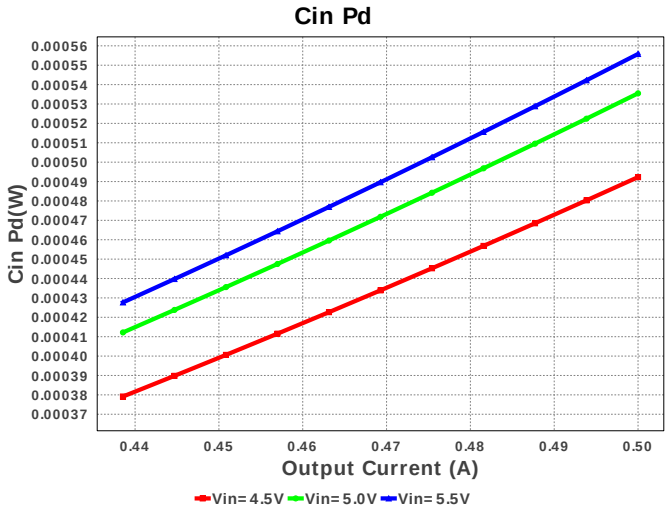


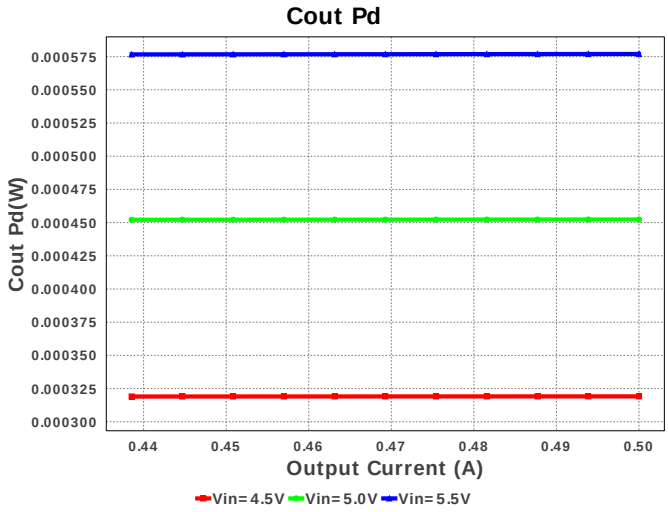


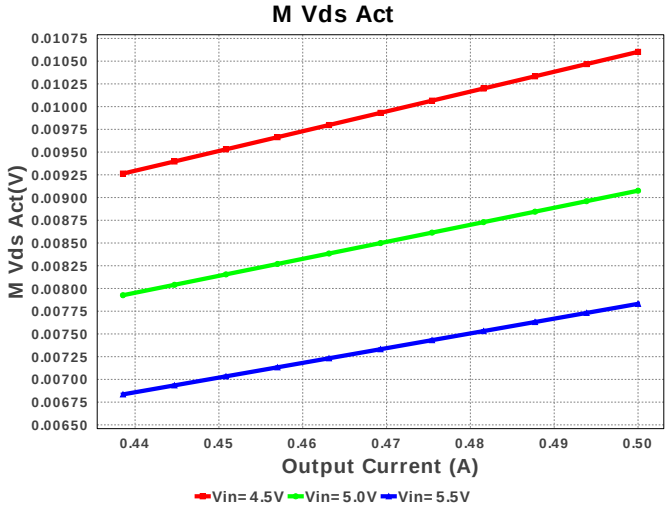


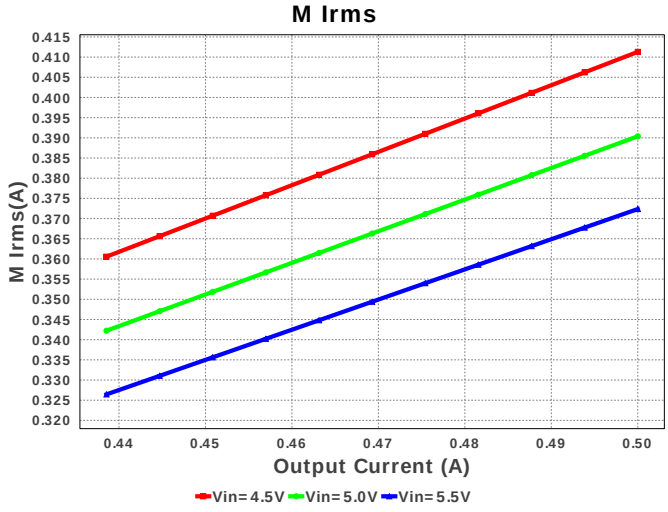


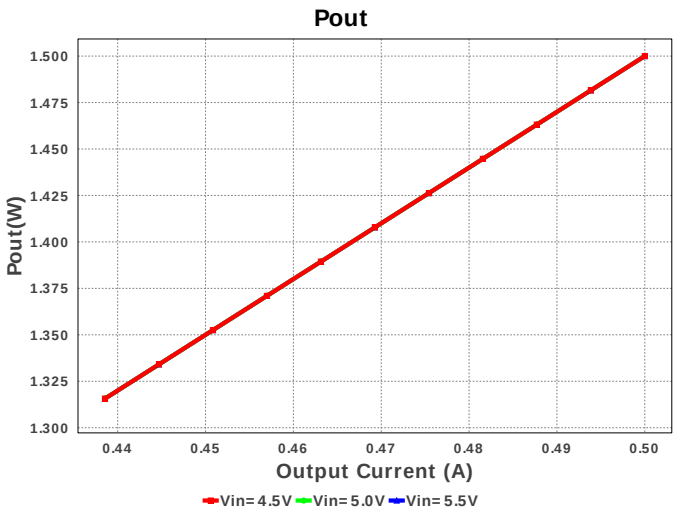


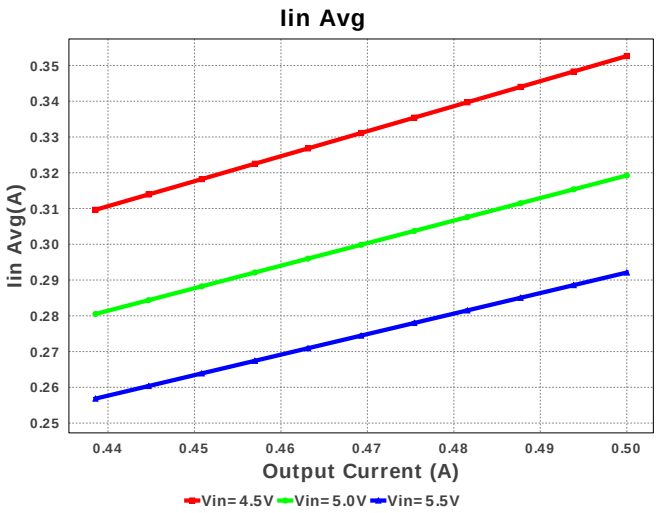


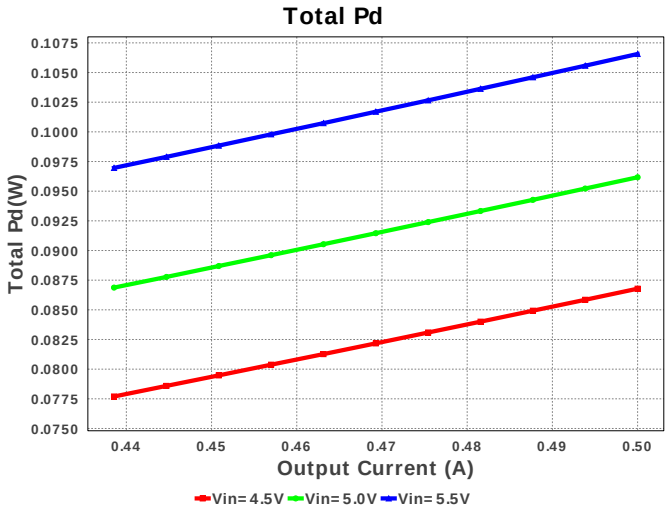


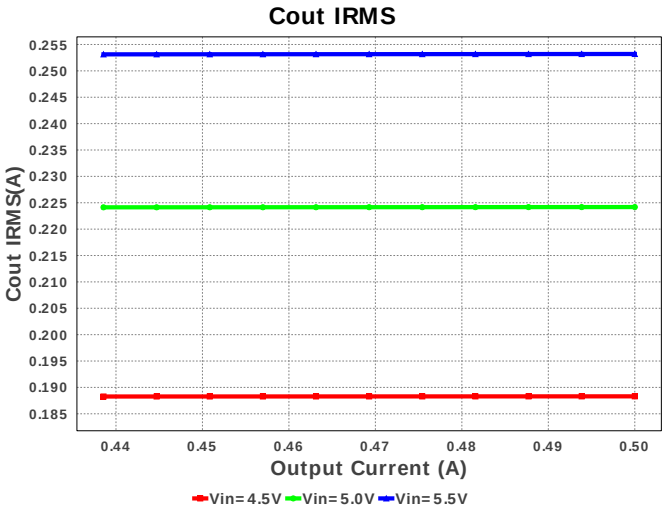


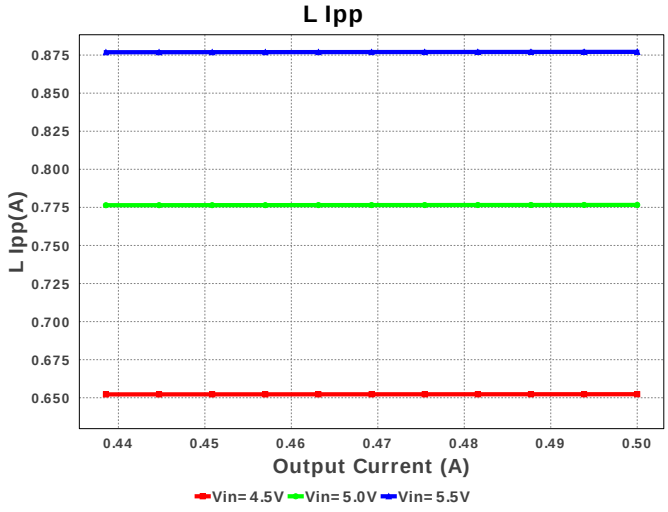


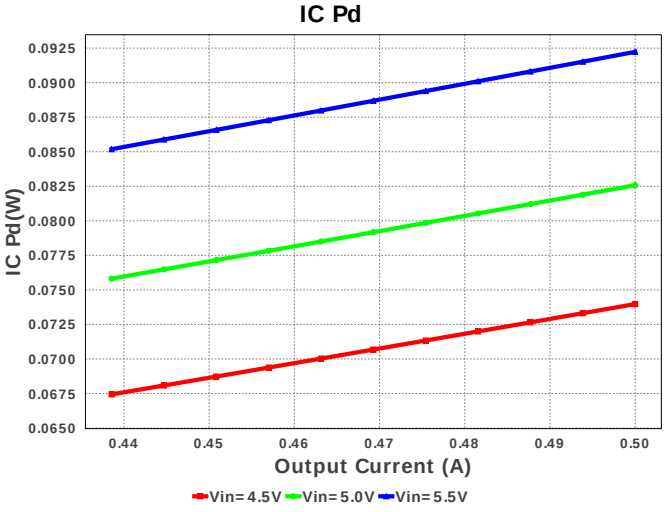












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	248.505 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	253.2 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	938.555 mA	Current	Peak switch current in IC
4.	Iin Avg	292.1 mA	Current	Average input current
5.	L Ipp	877.11 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	372.356 mA	Current	Q Iavg
7.	BOM Count	9	General	Total Design BOM count
8.	FootPrint	73.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.581 MHz	General	Switching frequency
10.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	7.831 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	1.5 W	General	Total output power
13.	Total BOM	$1.49	General	Total BOM Cost
14.	Vout Actual	2.987 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	3.0 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	55.46 %	Op_point	Duty cycle
17.	Efficiency	93.367 %	Op_point	Steady state efficiency
18.	IC Tj	34.335 degC	Op_point	IC junction temperature
19.	ICThetaJA	47.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	500.0 mA	Op_point	Iout operating point
21.	VIN_OP	5.5 V	Op_point	Vin operating point
22.	Vout p-p	9.248 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	555.793 µW	Power	Input capacitor power dissipation
24.	Cout Pd	576.991 µW	Power	Output capacitor power dissipation
25.	IC Pd	92.23 mW	Power	IC power dissipation
26.	L Pd	13.193 mW	Power	Inductor power dissipation
27.	Total Pd	106.562 mW	Power	Total Power Dissipation
28.	Vout Tolerance	3.509 %		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	5.5	Maximum input voltage
3.	VinMin	4.5	Minimum input voltage
4.	Vout	3.0	Output Voltage
5.	base_pn	TPS62090	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS62090** Product Folder : http://www.ti.com/product/TPS62090 : contains the data sheet and other resources.