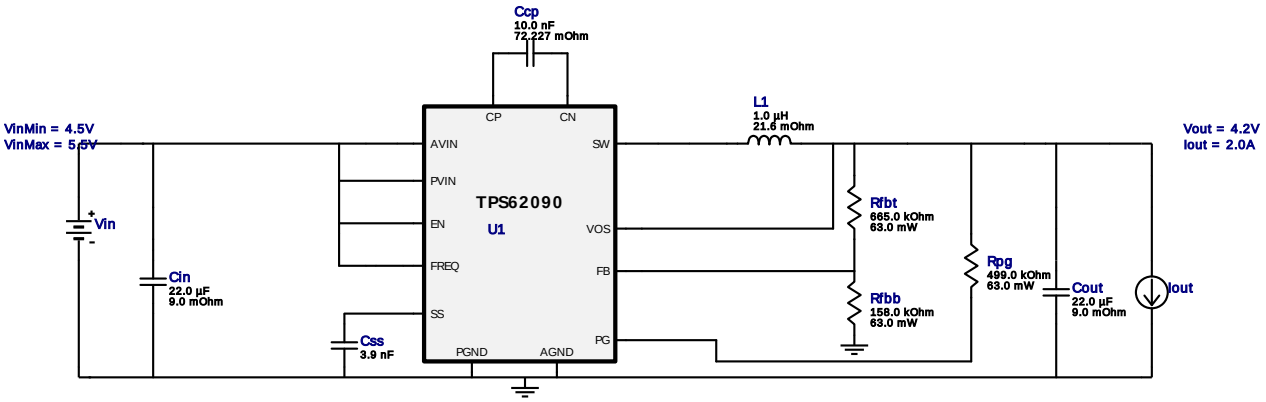
WEBENCH® Design Report

VinMin = 4.5V
VinMax = 5.5V
Vout = 4.2V
Iout = 2.0A

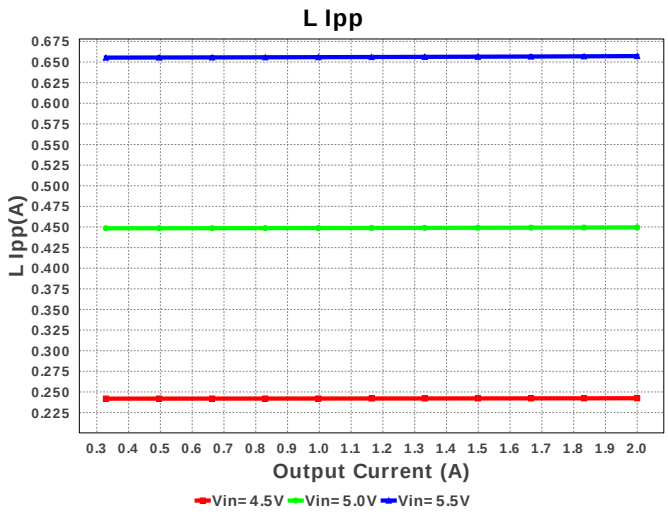
Device = TPS62090RGTR
Topology = Buck
Created = 7/16/15 10:22:20 AM
BOM Cost = $1.59
Footprint = 82.0 mm^2
BOM Count = 9
Total Pd = 0.43W

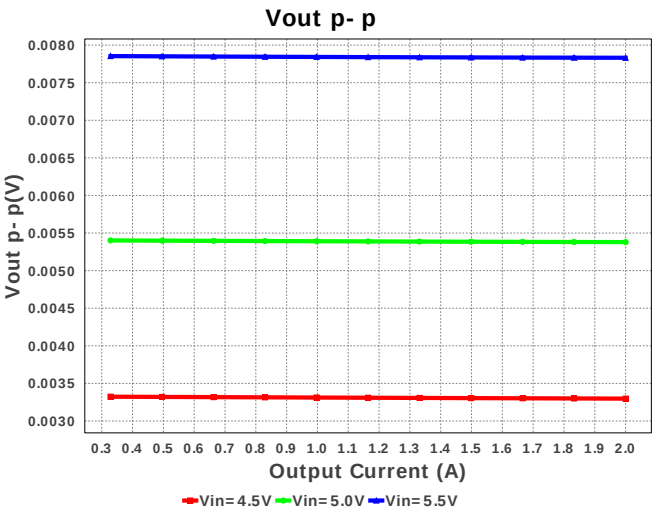
Design : 4371625/2 TPS62090RGTR
TPS62090RGTR 4.5V-5.5V to 4.20V @ 2.0A

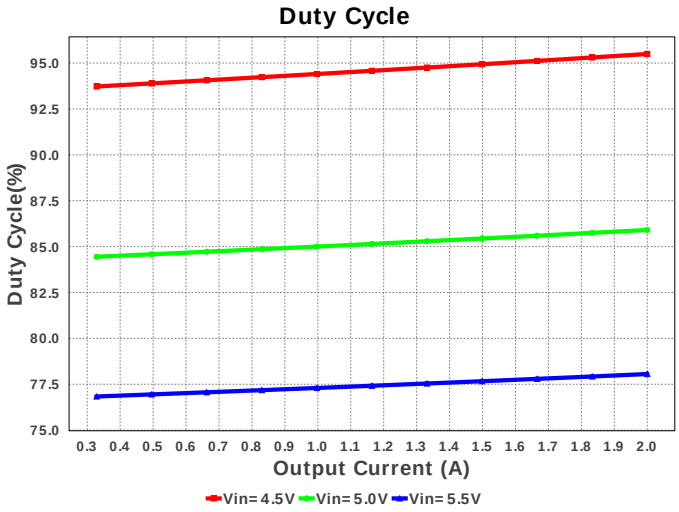


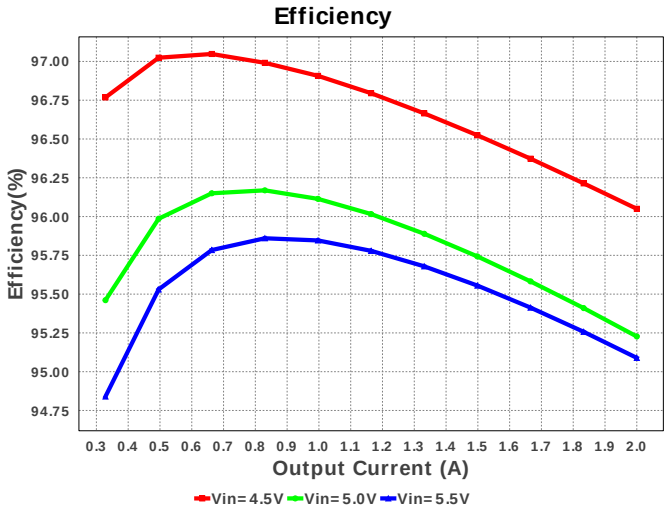
Electrical BOM

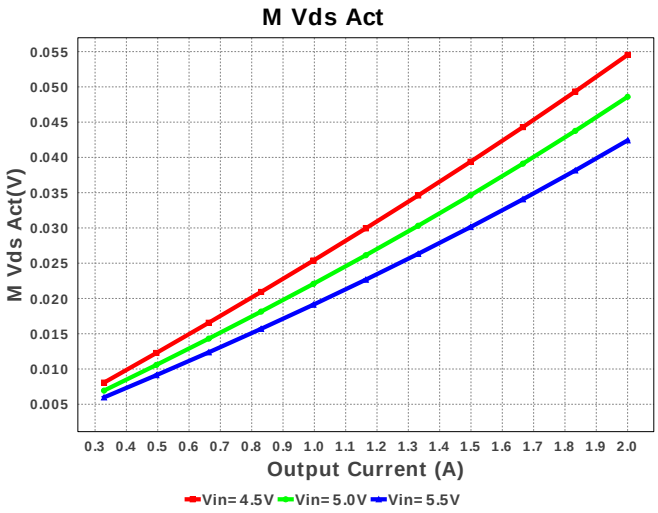
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccp	TDK	C1005X7R1E103K Series= X7R	Cap= 10.0 nF ESR= 72.227 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
2.	Cin	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	1	$0.05	0805 7 mm^2
3.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	1	$0.05	0805 7 mm^2
4.	Css	MuRata	GRM033R61A392KA01D Series= X5R	Cap= 3.9 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2
5.	L1	Bourns	SRP4020-1R0M	L= 1.0 µH DCR= 21.6 mOhm	1	$0.49	SRP4020 29 mm^2
6.	Rfbb	Vishay-Dale	CRCW0402158KFKED Series= CRCW..e3	Res= 158.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
7.	Rfbt	Vishay-Dale	CRCW0402665KFKED Series= CRCW..e3	Res= 665.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
8.	Rpg	Vishay-Dale	CRCW0402499KFKED Series= CRCW..e3	Res= 499.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
9.	U1	Texas Instruments	TPS62090RGTR	Switcher	1	$0.95	S-PVQFN-N16 25 mm^2

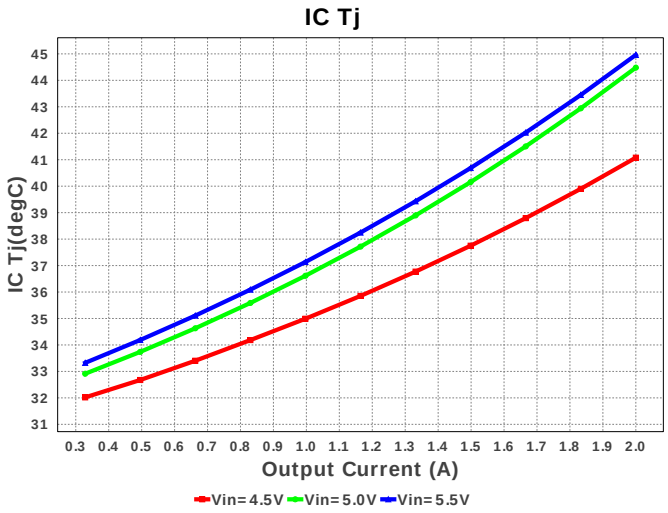




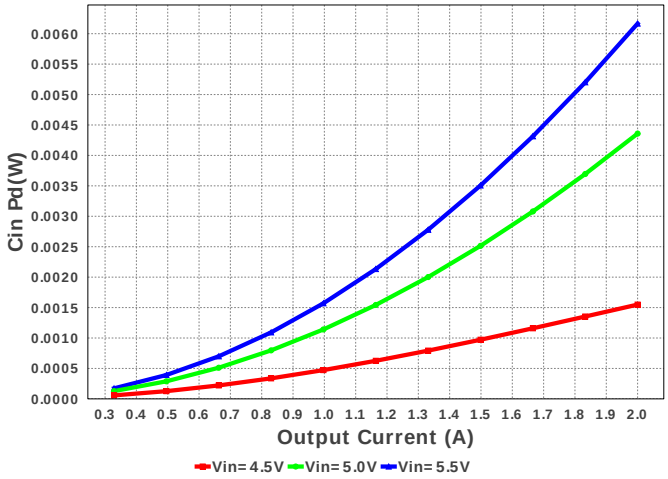




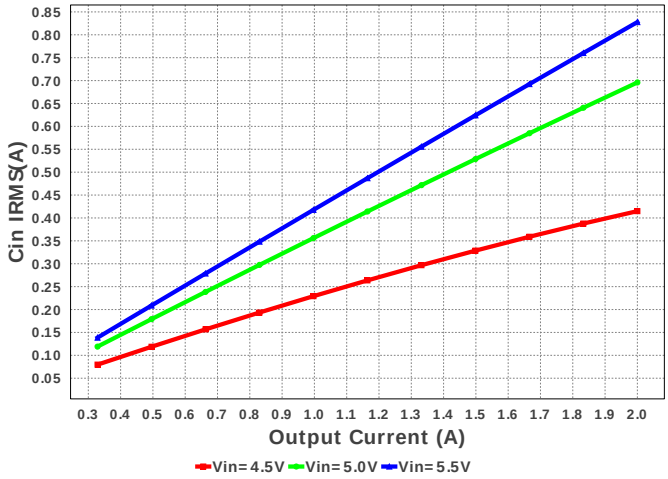




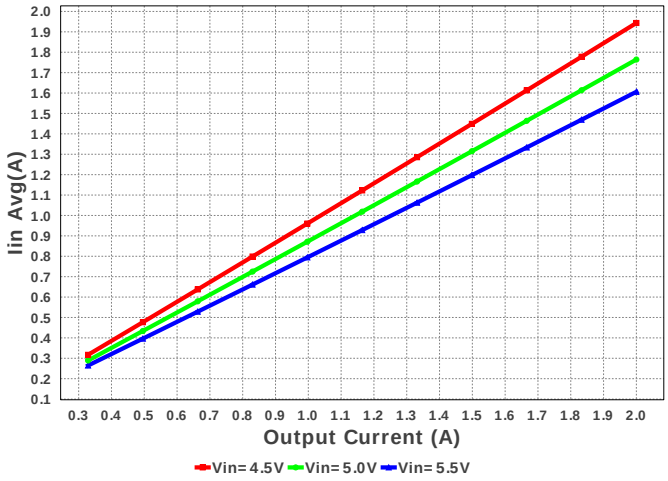
Cin Pd



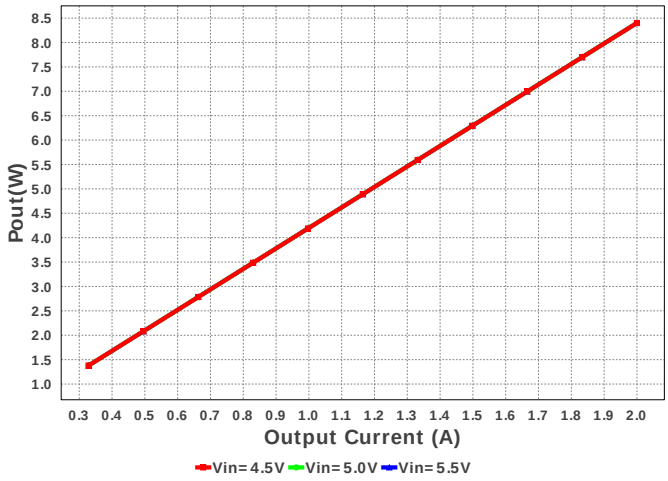
Cin IRMS



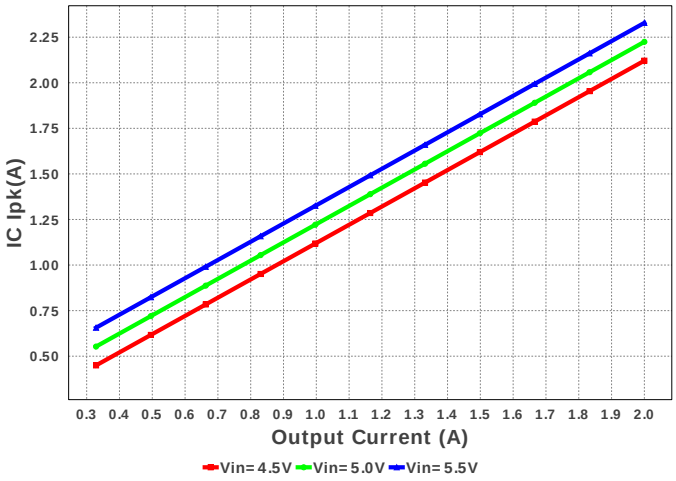
Iin Avg



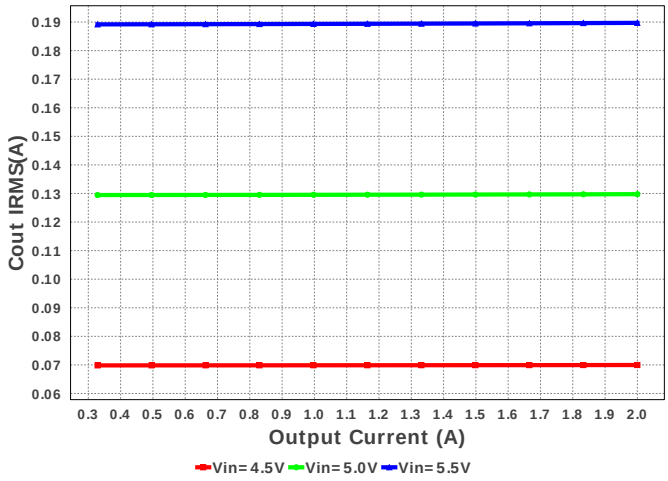
Pout

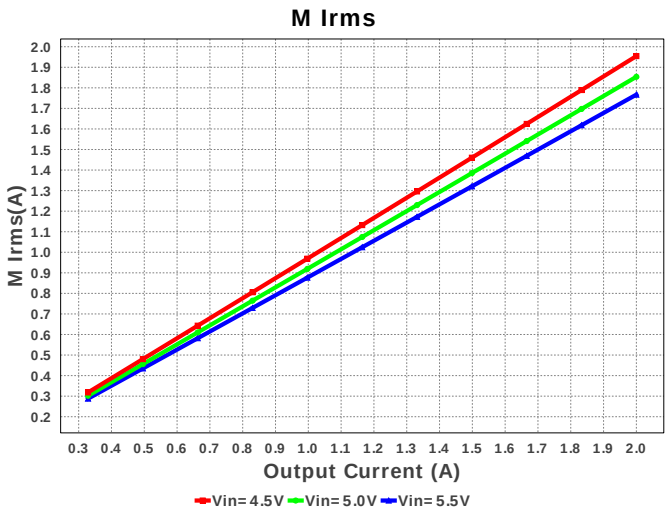


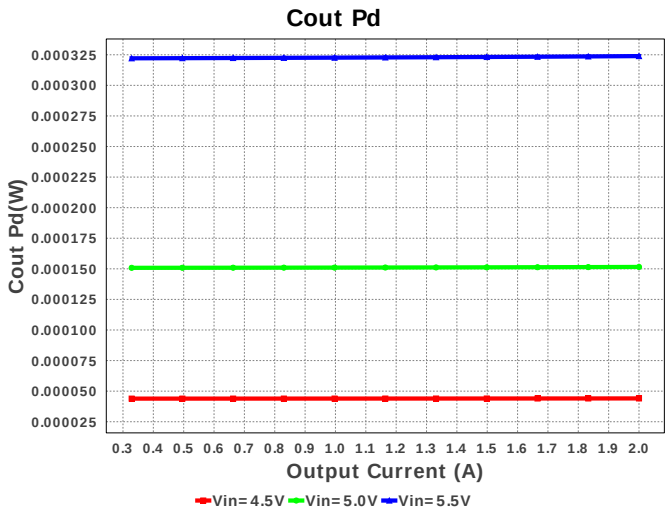
IC Ipk

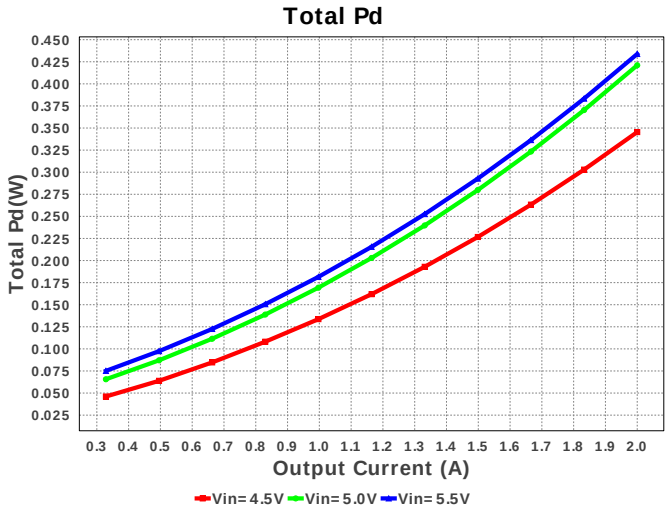


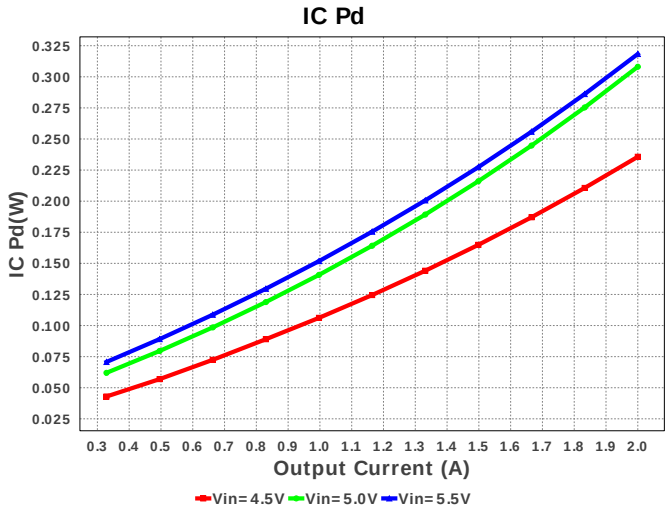
Cout IRMS

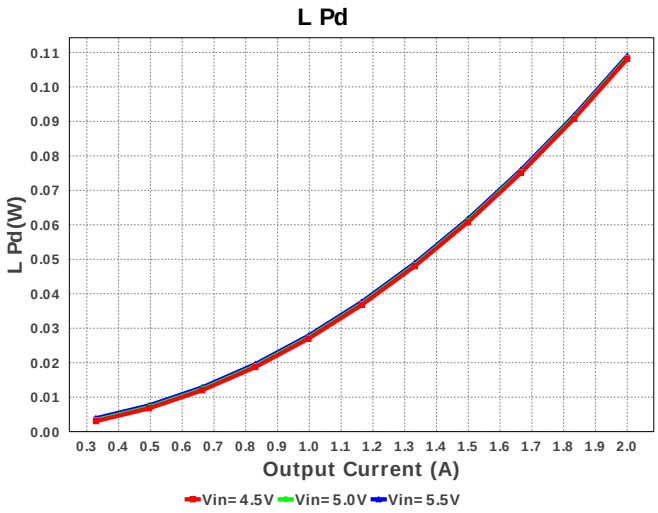












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	827.733 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	189.711 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.329 A	Current	Peak switch current in IC
4.	Iin Avg	1.606 A	Current	Average input current
5.	L Ipp	657.18 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.767 A	Current	Q Iavg
7.	BOM Count	9	General	Total Design BOM count
8.	FootPrint	82.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.544 MHz	General	Switching frequency
10.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	42.415 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	8.4 W	General	Total output power
13.	Total BOM	$1.59	General	Total BOM Cost
14.	Vout OP	4.2 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	78.056 %	Op_point	Duty cycle
16.	Efficiency	95.089 %	Op_point	Steady state efficiency
17.	IC Tj	44.962 degC	Op_point	IC junction temperature
18.	ICThetaJA	47.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	2.0 A	Op_point	Iout operating point
20.	VIN_OP	5.5 V	Op_point	Vin operating point
21.	Vout p-p	7.831 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	6.166 mW	Power	Input capacitor power dissipation
23.	Cout Pd	323.913 µW	Power	Output capacitor power dissipation
24.	IC Pd	318.349 mW	Power	IC power dissipation
25.	L Pd	108.972 mW	Power	Inductor power dissipation
26.	Total Pd	433.816 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	Iout1	2.0	Output Current #1
3.	VinMax	5.5	Maximum input voltage
4.	VinMin	4.5	Minimum input voltage
5.	Vout	4.2	Output Voltage
6.	Vout1	4.2	Output Voltage #1
7.	base_pn	TPS62090	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature

Design Assistance

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