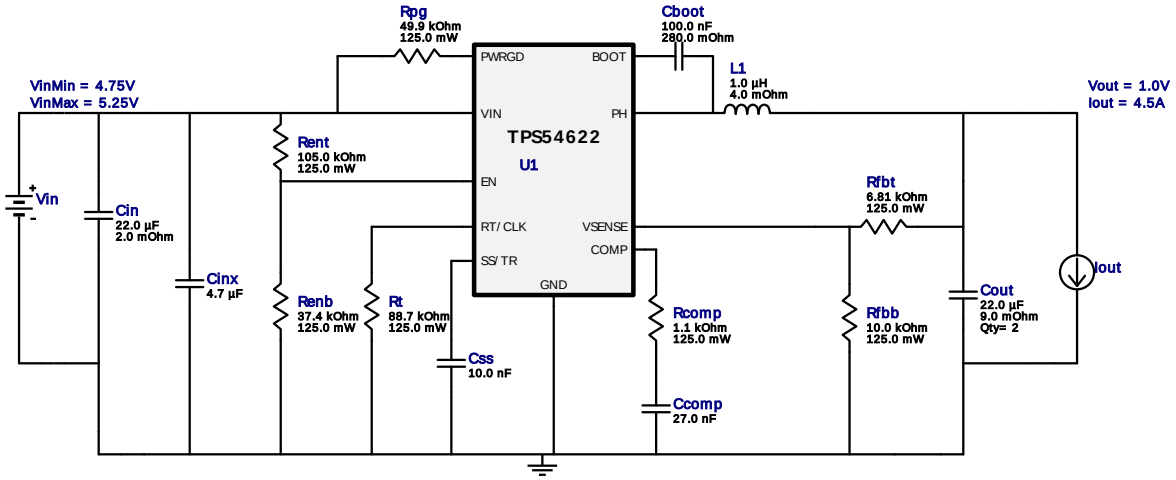
WEBENCH® Design Report

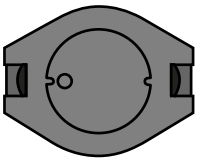
VinMin = 4.75V
VinMax = 5.25V
Vout = 1.0V
Iout = 4.5A

Device = TPS54622RHLR
Topology = Buck
Created = 6/24/13 2:57:09 AM
BOM Cost = $3.40
Total Pd = 0.9W
Footprint = 549.0mm2
BOM Count = 16

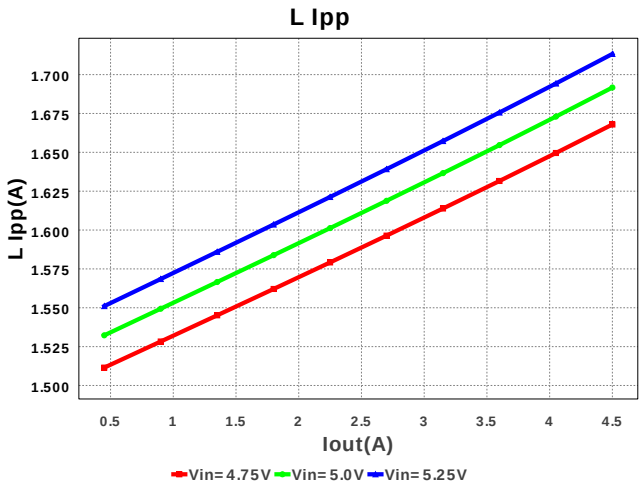
Design : 523997/14 TPS54622RHLR
TPS54622RHLR 4.75V-5.25V to 1.0V @ 4.5A

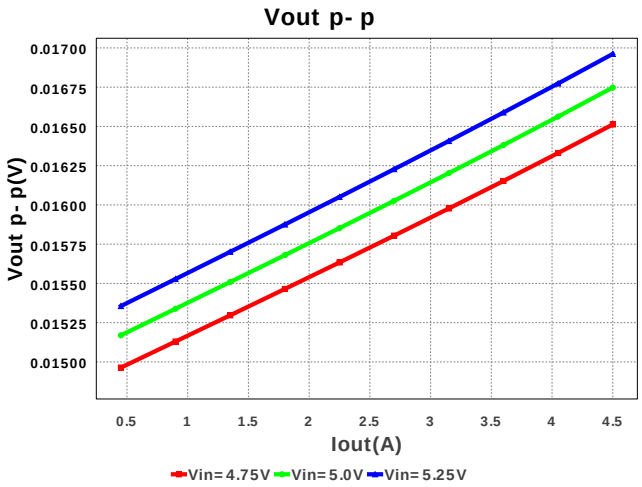


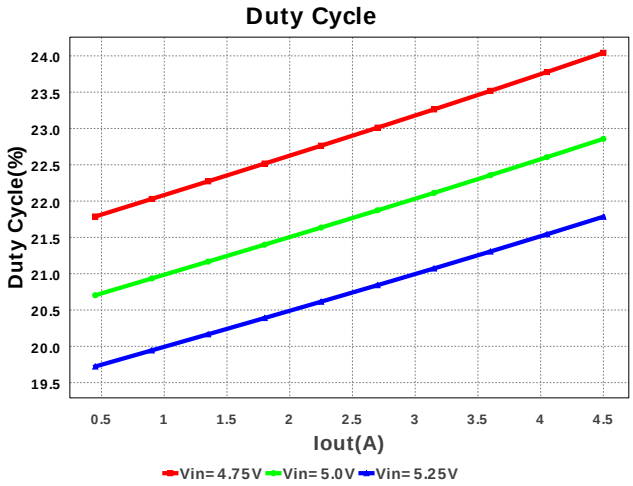
Electrical BOM

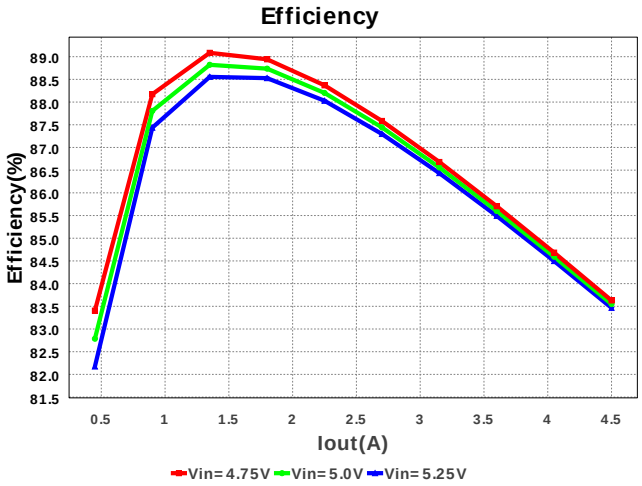
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
2.	Ccomp	Yageo America	CC0805KRX7R9BB273 Series= X7R	Cap= 27.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
3.	Cin	TDK	C3225X5R1A226M Series= X5R	Cap= 22.0 µF ESR= 2.0 mOhm VDC= 10.0 V IRMS= 3.2 A	1	$0.19	1210 23mm2
4.	Cinx	MuRata	GRM21BC81E475KA12L Series= 379	Cap= 4.7 µF VDC= 25.0 V IRMS= 0.0 A	1	$0.04	0805 13mm2
5.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 µF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	2	$0.05	0805 13mm2
6.	Css	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 13mm2
7.	L1	Bourns	SDR1806-1R0ML	L= 1.0 µH DCR= 4.0 mOhm	1	$0.47	 SDR1806 325mm2
8.	Rcomp	Vishay-Dale	CRCW08051K10FKEA Series= CRCW..e3	Res= 1.1 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 13mm2
9.	Renb	Vishay-Dale	CRCW080537K4FKEA Series= CRCW..e3	Res= 37.4 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 13mm2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rent	Vishay-Dale	CRCW0805105KFKEA Series= CRCW..e3	Res= 105.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 13mm2
11.	Rfbb	Vishay-Dale	CRCW080510K0FKEA Series= CRCW..e3	Res= 10.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 13mm2
12.	Rfbt	Vishay-Dale	CRCW08056K81FKEA Series= CRCW..e3	Res= 6.81 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 13mm2
13.	Rpg	Vishay-Dale	CRCW080549K9FKEA Series= CRCW..e3	Res= 49.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 13mm2
14.	Rt	Vishay-Dale	CRCW080588K7FKEA Series= CRCW..e3	Res= 88.7 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 13mm2
15.	U1	Texas Instruments	TPS54622RHLR	Switcher	1	$2.50	S-PVQFN-N14 32mm2

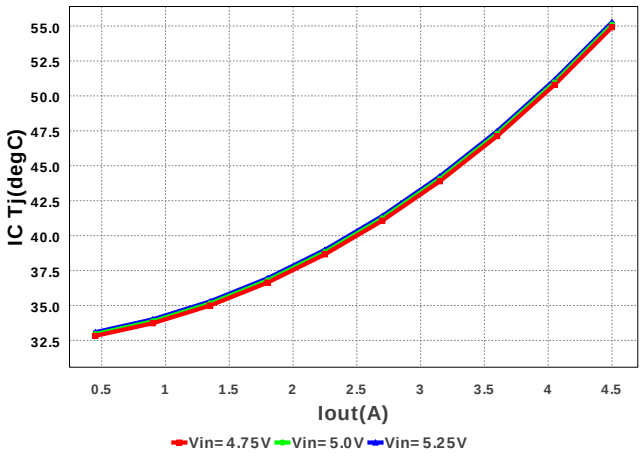




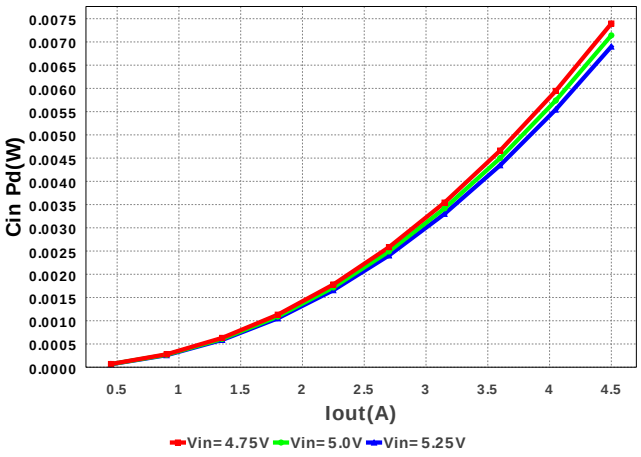




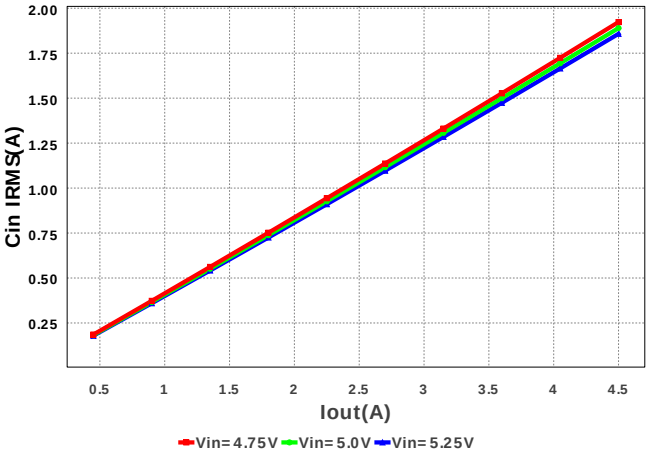
IC Tj



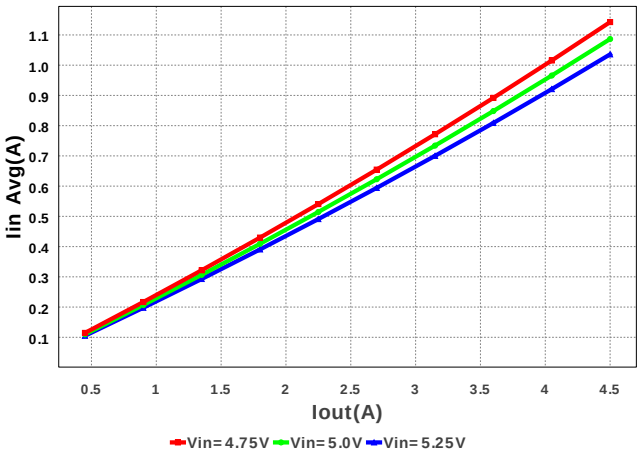
Cin Pd



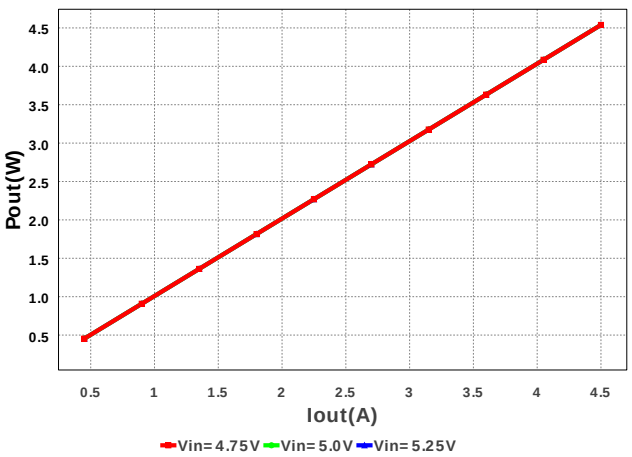
Cin IRMS



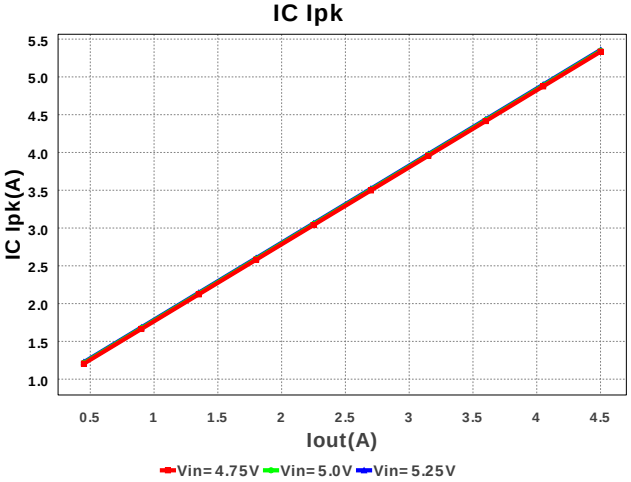
Iin Avg



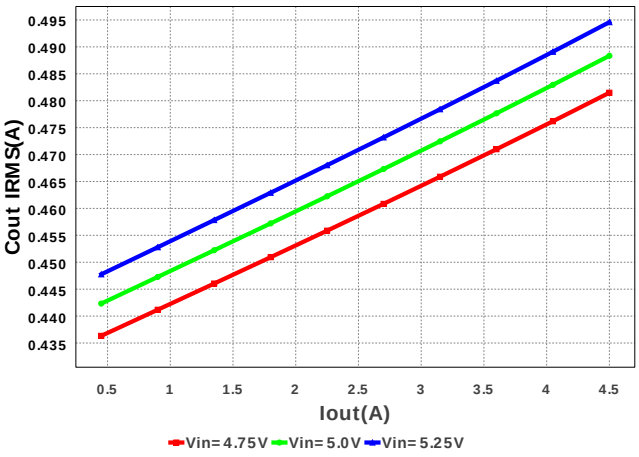
Pout



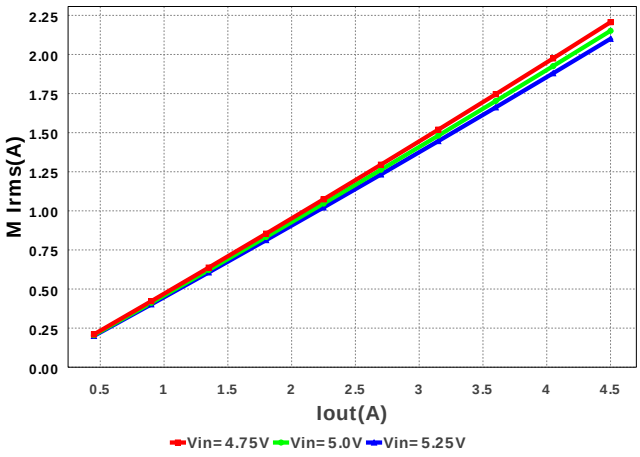
IC Ipk



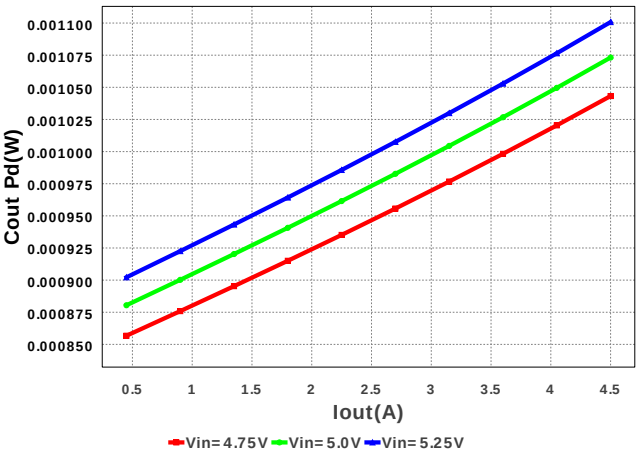
Cout IRMS



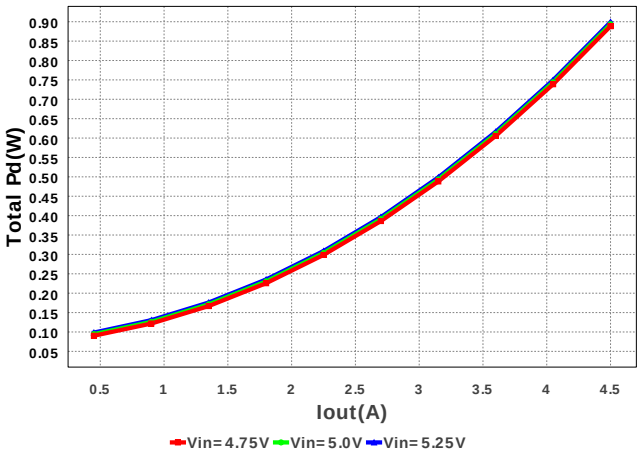
M Irms



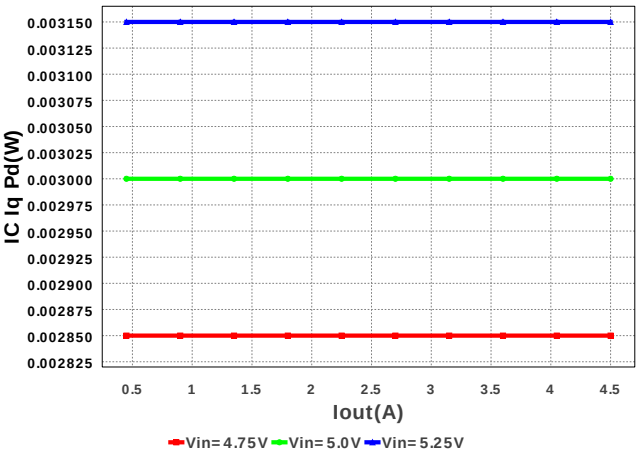
Cout Pd



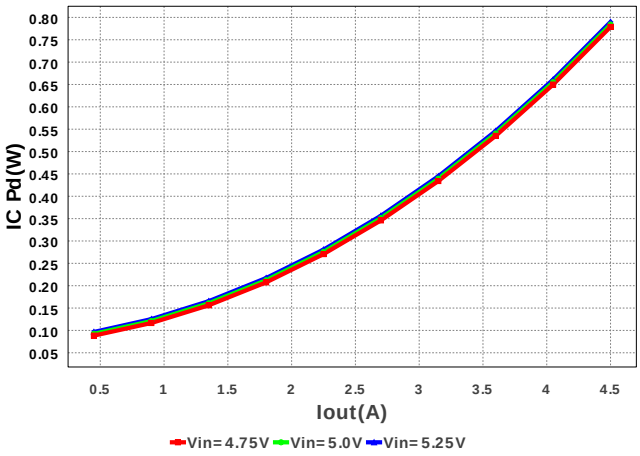
Total Pd

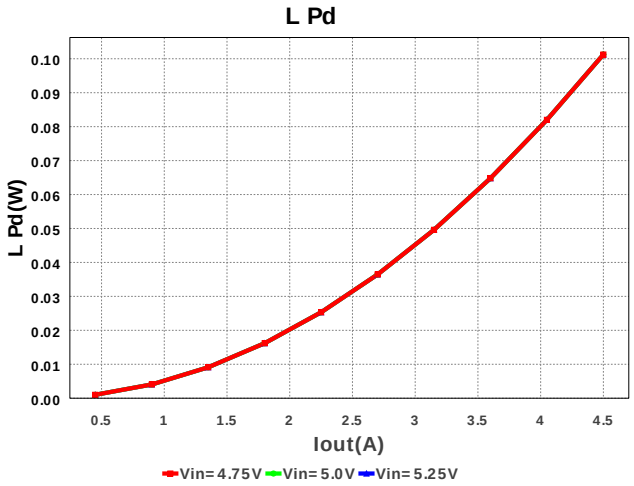


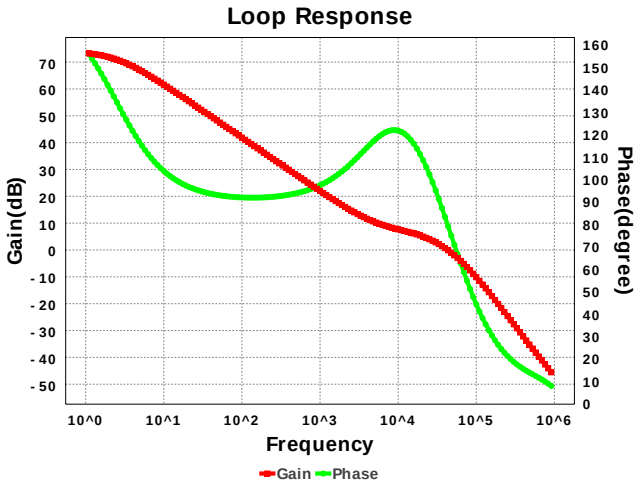
IC Iq Pd



IC Pd







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.853 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	482.479 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	5.336 A	Current	Peak switch current in IC
4.	Iin Avg	1.029 A	Current	Average input current
5.	L Ipp	1.671 A	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	2.093 A	Current	Q Iavg
7.	BOM Count	16	General	Total Design BOM count
8.	FootPrint	549.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	550.0 kHz	General	Switching frequency
10.	IC Tolerance	10.0 mV	General	IC Feedback Tolerance
11.	Mode	CCM	General	Conduction Mode
12.	Pout	4.5 W	General	Total output power
13.	Total BOM	$3.4	General	Total BOM Cost
14.	Vout OP	1.0 V	Op_Point	Operational Output Voltage
15.	Cross Freq	43.336 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	21.629 %	Op_point	Duty cycle
17.	Efficiency	83.29 %	Op_point	Steady state efficiency
18.	IC Tj	55.397 degC	Op_point	IC junction temperature
19.	ICThetaJA	32.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	4.5 A	Op_point	Iout operating point
21.	Phase Marg	79.821 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	5.25 V	Op_point	Vin operating point
23.	Vout p-p	16.362 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	6.865 mW	Power	Input capacitor power dissipation
25.	Cout Pd	1.048 mW	Power	Output capacitor power dissipation
26.	IC Iq Pd	3.15 mW	Power	IC Iq Pd
27.	IC Pd	793.643 mW	Power	IC power dissipation
28.	L Pd	101.25 mW	Power	Inductor power dissipation
29.	Total Pd	902.804 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	4.5 A	Maximum Output Current
2.	Iout1	4.5 Amps	Output Current #1
3.	SoftStart	3.0 ms	Soft Start Time (ms)
4.	VinMax	5.25 V	Maximum input voltage
5.	VinMin	4.75 V	Minimum input voltage
6.	Vout	1.0 V	Output Voltage
7.	Vout1	1.0 Volt	Output Voltage #1
8.	base_pn	TPS54622	Base Product Number
9.	source	DC	Input Source Type
10.	Ta	30.0 degC	Ambient temperature
11.	UserFsw	900.0 kHz	Customer Selected Frequency

Design Assistance

1. **TPS54622** Product Folder : http://www.ti.com/product/tps54622 : contains the data sheet and other resources.