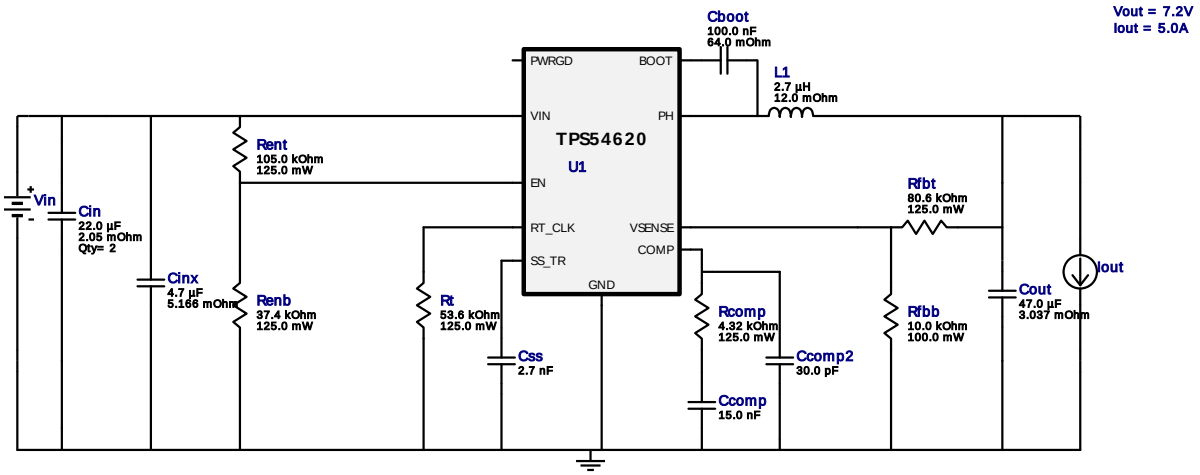
WEBENCH® Design Report

VinMin = 9.0V
VinMax = 12.6V
Vout = 7.2V
Iout = 5.0A

Device = TPS54620RHLR
Topology = Buck
Created = 2018-03-26 02:47:54.457
BOM Cost = $3.35
BOM Count = 16
Total Pd = 2.02W

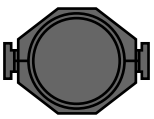
Design : 5286684/34 TPS54620RHLR
TPS54620RHLR 9.0V-12.6V to 7.20V @ 5.0A



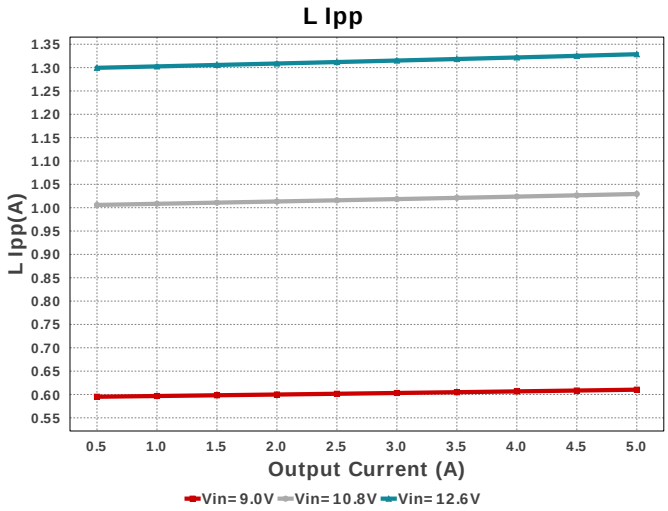
My Comments

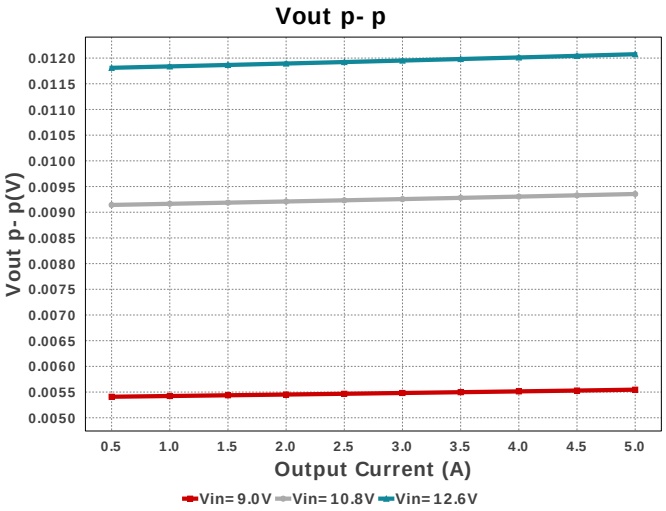
No comments

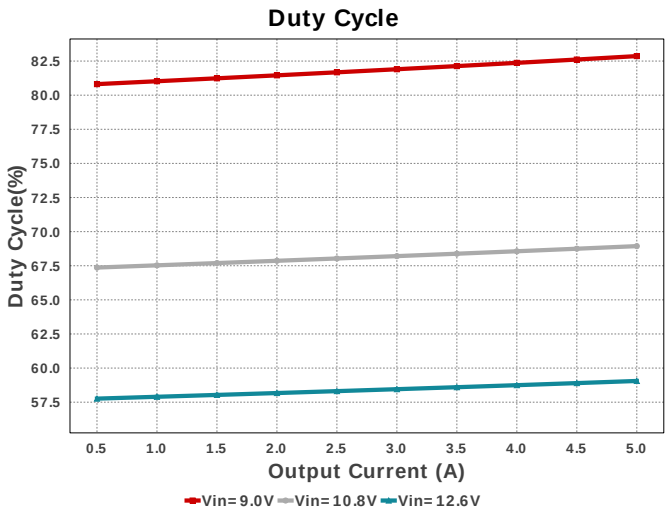
Electrical BOM

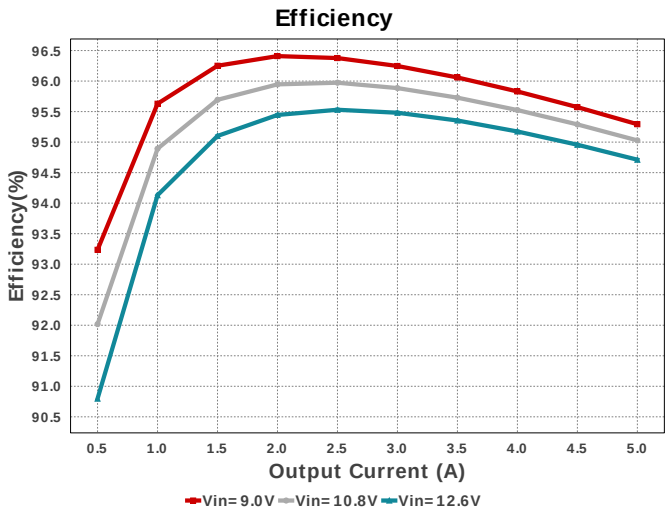
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K3RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 25.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
2.	Ccomp	TDK	C2012C0G1H153J085AA Series= C0G/NP0	Cap= 15.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.07	0805 7 mm²
3.	Ccomp2	Samsung Electro-Mechanics	CL21C300JBANNNC Series= C0G/NP0	Cap= 30.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	TDK	C2012X5R1V226M125AC Series= X5R	Cap= 22.0 uF ESR= 2.05 mOhm VDC= 35.0 V IRMS= 4.5559 A	2	$0.35	0805 7 mm²
5.	Cinx	MuRata	GRM21BC81E475KA12L Series= X6S	Cap= 4.7 uF ESR= 5.166 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	$0.03	0805 7 mm²
6.	Cout	MuRata	GRM32ER61A476KE20L Series= X5R	Cap= 47.0 uF ESR= 3.037 mOhm VDC= 10.0 V IRMS= 4.6162 A	1	$0.28	1210_280 15 mm²
7.	Css	TDK	C2012C0G1H272K060AA Series= C0G/NP0	Cap= 2.7 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
8.	L1	NIC Components	NPI31P2R7MTRF	L= 2.7 µH DCR= 12.0 mOhm	1	$0.17	 IND_NPI31P 185 mm²

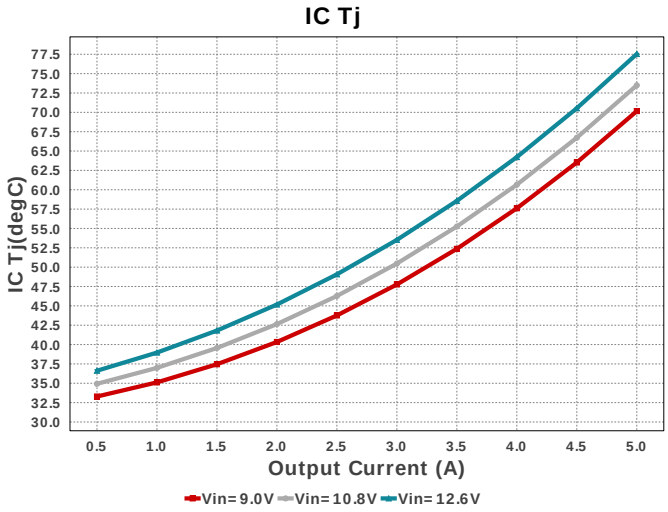
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Rcomp	Panasonic	ERJ-6ENF4321V Series= ERJ-6E	Res= 4.32 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
10.	Renb	Panasonic	ERJ-6ENF3742V Series= ERJ-6E	Res= 37.4 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
11.	Rent	Panasonic	ERJ-6ENF1053V Series= ERJ-6E	Res= 105.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
12.	Rfbb	Susumu Co Ltd	RR1220P-103-D Series= RR12	Res= 10.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	$0.01	0805 7 mm²
13.	Rfbt	Vishay-Dale	CRCW080580K6FKEA Series= CRCW..e3	Res= 80.6 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
14.	Rt	Panasonic	ERJ-6ENF5362V Series= ERJ-6E	Res= 53.6 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
15.	U1	Texas Instruments	TPS54620RHLR	Switcher	1	$1.99	S-PVQFN-N14 22 mm²

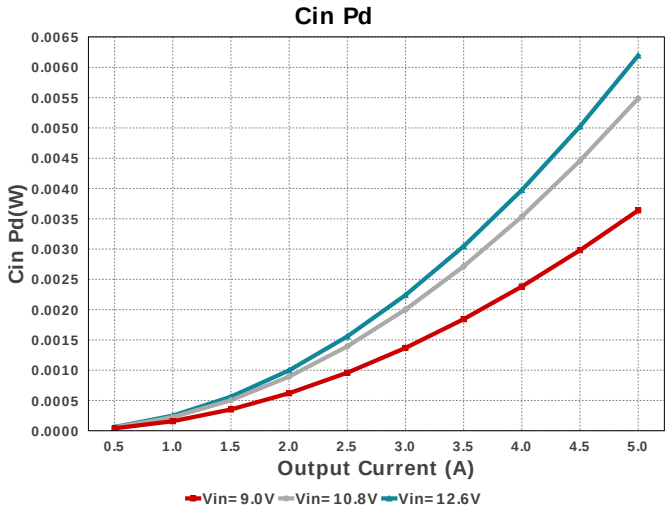


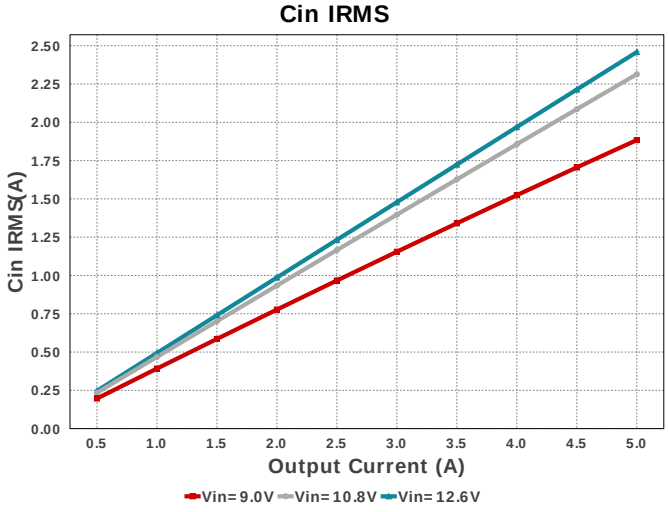


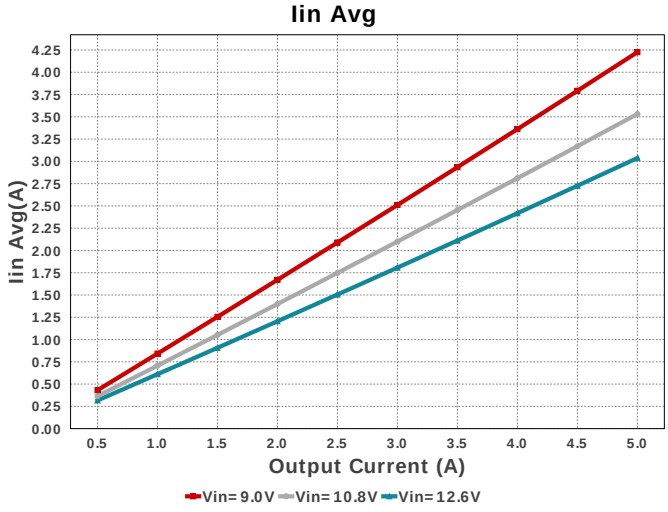


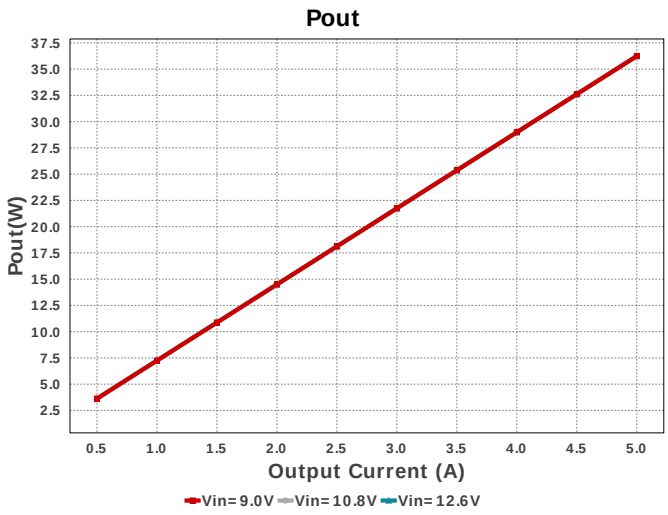


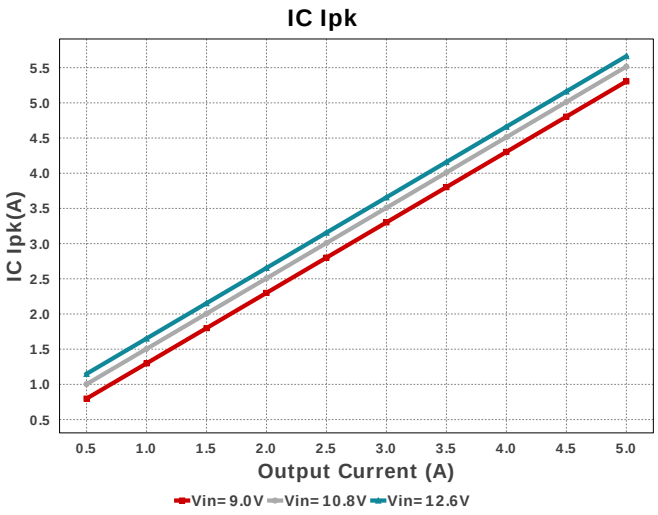


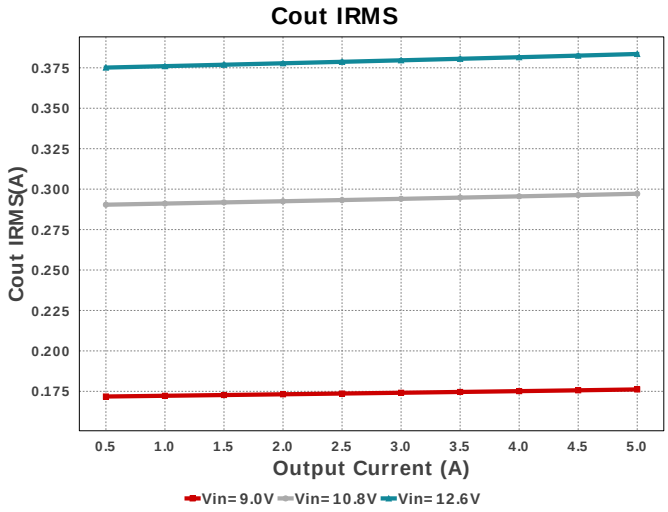


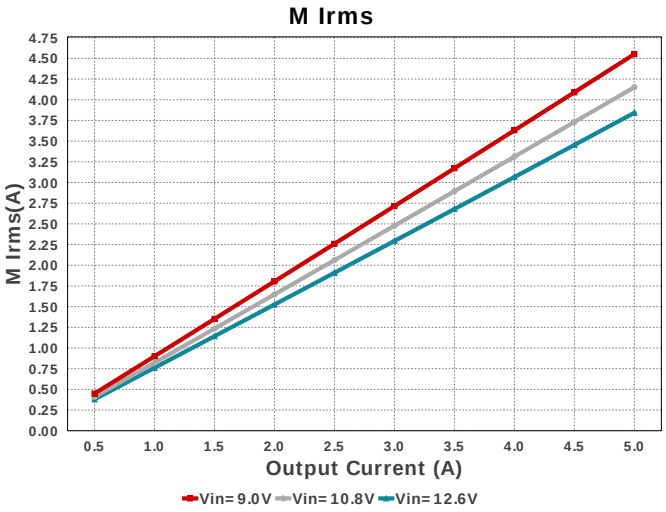


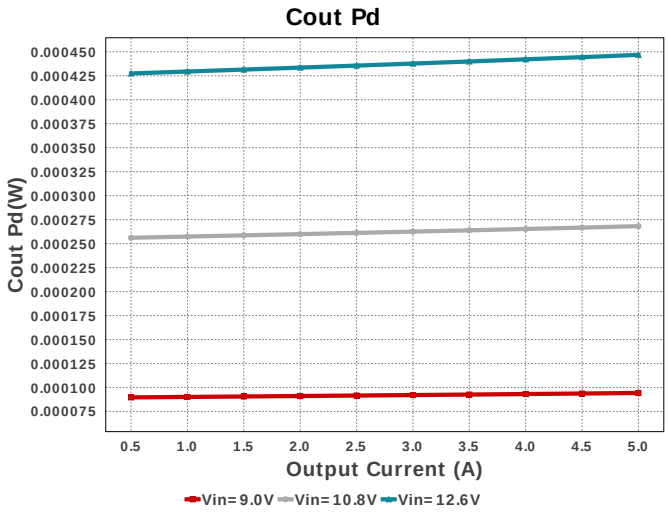


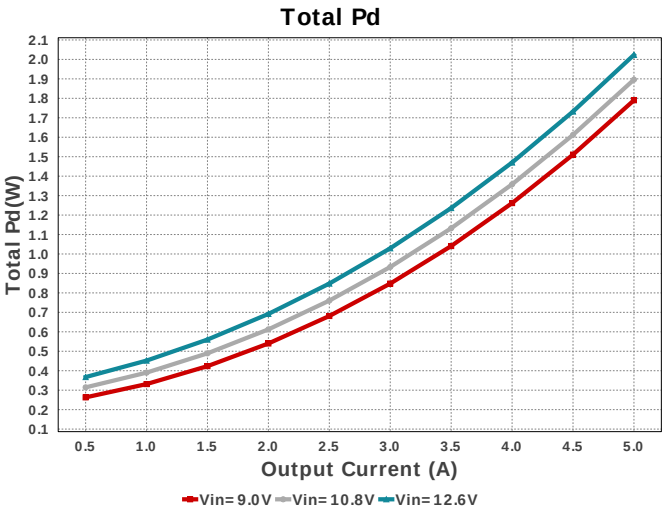


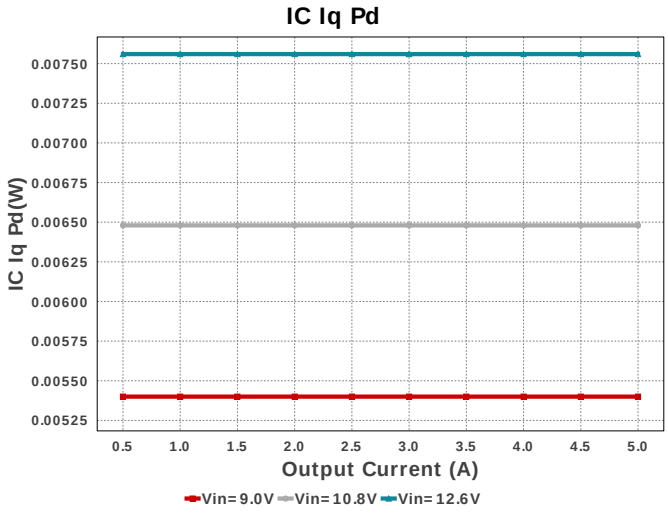


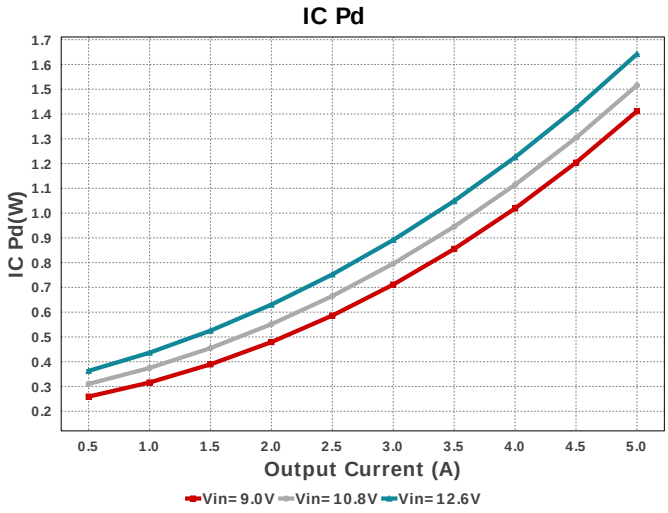


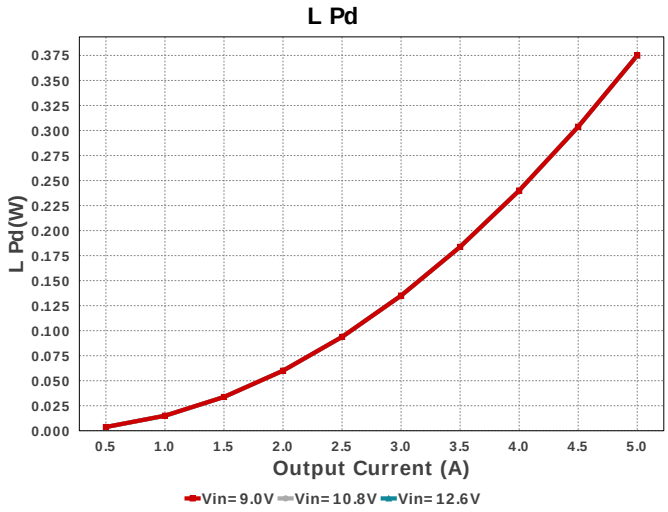


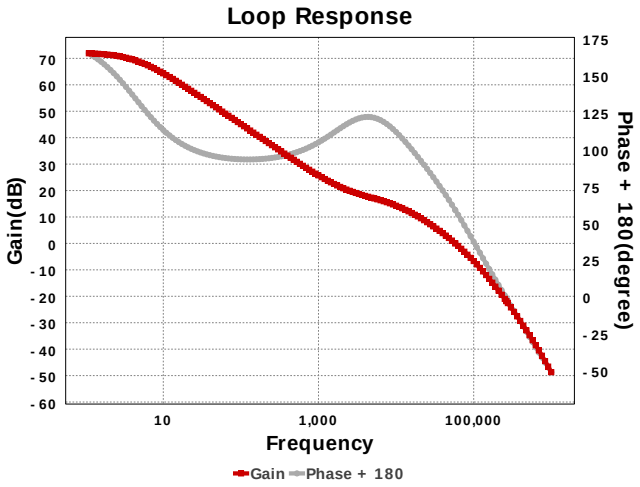












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.462 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	384.483 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	5.666 A	Current	Peak switch current in IC
4.	Iin Avg	3.018 A	Current	Average input current
5.	L Ipp	1.332 A	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	3.83 A	Current	Q Iavg
7.	BOM Count	16	General	Total Design BOM count
8.	FootPrint	309.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	881.052 kHz	General	Switching frequency
10.	IC Tolerance	8.0 mV	General	IC Feedback Tolerance
11.	Mode	CCM	General	Conduction Mode
12.	Pout	36.0 W	General	Total output power
13.	Total BOM	$3.35	General	Total BOM Cost
14.	Cross Freq	57.971 kHz	Op Point	Bode plot crossover frequency
15.	Duty Cycle	58.673 %	Op Point	Duty cycle
16.	Efficiency	94.68 %	Op Point	Steady state efficiency
17.	Gain Marg	-21.903 dB	Op Point	Bode Plot Gain Margin
18.	IC Tj	77.516 degC	Op Point	IC junction temperature
19.	ICThetaJA	32.0 degC/W	Op Point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	5.0 A	Op Point	Iout operating point
21.	Low Freq Gain	71.929 dB	Op Point	Gain at 1Hz
22.	Phase Marg	59.618 deg	Op Point	Bode Plot Phase Margin
23.	VIN_OP	12.6 V	Op Point	Vin operating point
24.	Vout Actual	7.248 V	Op Point	Vout Actual calculated based on selected voltage divider resistors
25.	Vout OP	7.2 V	Op Point	Operational Output Voltage
26.	Vout Tolerance	2.355 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
27.	Vout p-p	12.054 mV	Op Point	Peak-to-peak output ripple voltage
28.	Cin Pd	6.213 mW	Power	Input capacitor power dissipation
29.	Cout Pd	448.951 µW	Power	Output capacitor power dissipation
30.	IC Iq Pd	7.56 mW	Power	IC Iq Pd

#	Name	Value	Category	Description
31.	IC Pd	1.641 W	Power	IC power dissipation
32.	L Pd	375.0 mW	Power	Inductor power dissipation
33.	Total Pd	2.023 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	VinMax	12.6	Maximum input voltage
3.	VinMin	9.0	Minimum input voltage
4.	VinTyp	11.1	Typical input voltage
5.	Vout	7.2	Output Voltage
6.	base_pn	TPS54620	Base Product Number
7.	source	DC	Input Source Type
8.	Ta	25.0	Ambient temperature

Design Assistance

1. **TPS54620** Product Folder : http://www.ti.com/product/TPS54620 : contains the data sheet and other resources.