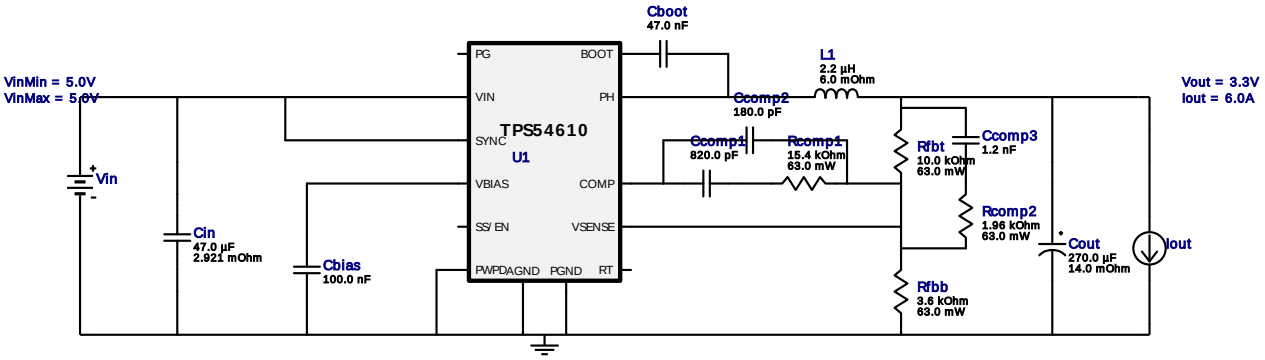
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 5.0V
VinMax = 5.0V
Vout = 3.3V
Iout = 6.0A

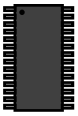
Device = TPS54610PWPR
Topology = Buck
Created = 7/16/15 6:48:41 PM
BOM Cost = $5.18
Footprint = 493.0 mm^2
BOM Count = 13
Total Pd = 1.7W

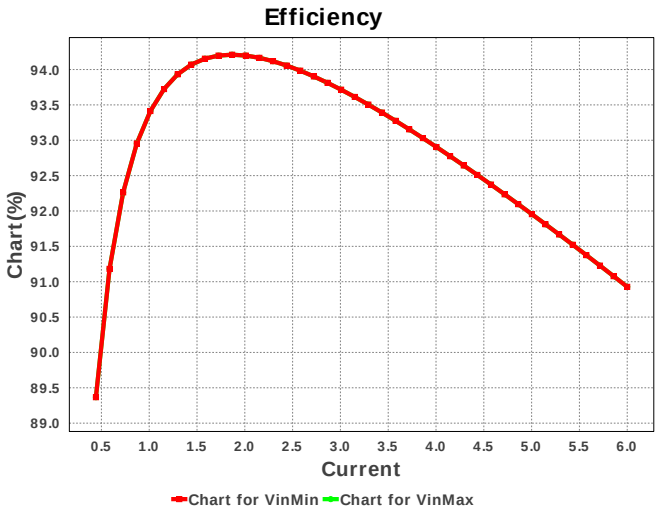
Design : 4232493/6 TPS54610PWPR
TPS54610PWPR 5.0V-5.0V to 3.30V @ 6.0A

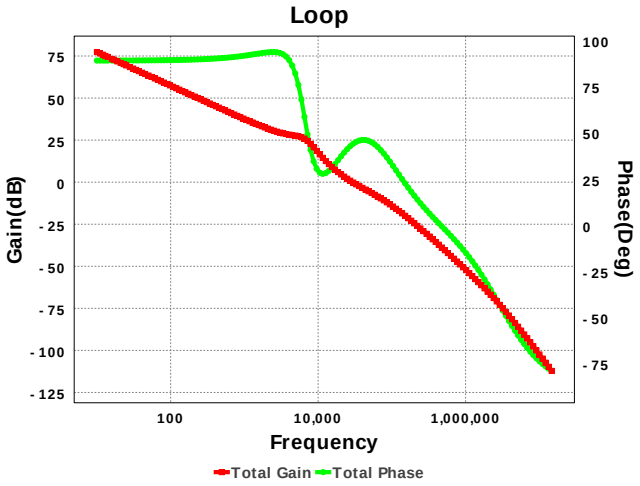


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	Kemet	C0603C104J3RAC Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.16	0603 5 mm^2
2.	Cboot	MuRata	GRM155R71E473KA88D Series= X7R	Cap= 47.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	Ccomp1	MuRata	GRM1555C1E821JA01D Series= C0G/NP0	Cap= 820.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.02	0402 3 mm^2
4.	Ccomp2	Kemet	C0603C181J5GACTU Series= C0G/NP0	Cap= 180.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2
5.	Ccomp3	MuRata	GRM188R71E122KA01D Series= X7R	Cap= 1.2 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2
6.	Cin	TDK	C4532X5R1A476M Series= X5R	Cap= 47.0 uF ESR= 2.921 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.63	1812 23 mm^2
7.	Cout	Chemi-Con	APXA100ARA271MHC0G Series= PXA	Cap= 270.0 uF ESR= 14.0 mOhm VDC= 10.0 V IRMS= 4.42 A	1	$0.85	CAPSMT_62_HC0 110 mm^2
8.	L1	Bourns	SDR1307-2R2ML	L= 2.2 µH DCR= 6.0 mOhm	1	$0.35	SDR1307 227 mm^2
9.	Rcomp1	Vishay-Dale	CRCW040215K4FKED Series= CRCW..e3	Res= 15.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
10.	Rcomp2	Vishay-Dale	CRCW04021K96FKED Series= CRCW..e3	Res= 1.96 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rfbb	Vishay-Dale	CRCW04023K60JNED Series= CRCW..e3	Res= 3.6 kOhm Power= 63.0 mW Tolerance= 5.0%	1	$0.01	0402 3 mm^2
12.	Rfbt	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
13.	U1	Texas Instruments	TPS54610PWPR	Switcher	1	$3.10	 R-PDSO-G28 101 mm^2





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.73 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	270.0 mA	Current	Output capacitor RMS ripple current
3.	IC Irms	6.01 A	Current	Calculated current across IC
4.	L Ipp Max	947.0 mA	Current	Inductor Peak to Peak Current calculated Max
5.	L Ipp Min	947.0 mA	Current	Inductor Peak to Peak Current calculated Min
6.	L1 Irms	6.01 A	Current	Inductor ripple current
7.	BOM Count	13	General	Total Design BOM count
8.	FootPrint	493.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	550.0 kHz	General	Switching frequency
10.	IC Tolerance	8.91 mV	General	IC Feedback Tolerance
11.	Pout	19.8 W	General	Total output power
12.	Total BOM	$5.18	General	Total BOM Cost
13.	Cin Vdrop	5.03 V	Op_Point	Calculated voltage across input cap
14.	Cout Vdrop	3.32 V	Op_Point	Calculated voltage across output capacitor
15.	ESR Zero Freq	42.104 kHz	Op_Point	ESR Zero Frequency
16.	IC Vdrop	5.03 V	Op_Point	Calculated voltage across IC
17.	LC Conner Freq	6.53 kHz	Op_Point	LC conner frequency
18.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
19.	Cross Freq	29.438 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	71.1 %	Op_point	Duty cycle
21.	Efficiency	90.927 %	Op_point	Steady state efficiency
22.	Gain Marg	-38.993 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	47.0 degC	Op_point	IC junction temperature
24.	IOUT_OP	6.0 A	Op_point	Iout operating point
25.	Phase Marg	44.727 deg	Op_point	Bode Plot Phase Margin
26.	VIN_OP	5.0 V	Op_point	Vin operating point
27.	Vout p-p	13.3 mV	Op_point	Peak-to-peak output ripple voltage
28.	Cin Pd	13.0 mW	Power	Input capacitor power dissipation
29.	Cout Pd	1.0 mW	Power	Output capacitor power dissipation
30.	IC Pd	1.7 W	Power	IC power dissipation
31.	M1 Rdson Max	37.0 mOhm	Power	High side FET Rdson max
32.	M1 Rdson Min	37.0 mOhm	Power	High side FET Rdson min
33.	M2 Rdson Max	36.0 mOhm	Power	Low side FET Rdson Max
34.	M2 Rdson Min	36.0 mOhm	Power	Low side FET Rdson Min
35.	Total Pd	1.7 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	6.0	Maximum Output Current
2.	Iout1	6.0	Output Current #1
3.	VinMax	5.0	Maximum input voltage
4.	VinMin	5.0	Minimum input voltage
5.	Vout	3.3	Output Voltage
6.	Vout1	3.3	Output Voltage #1
7.	base_pn	TPS54610	Texas Instruments Base Part Number
8.	source	DC	Input Source Type
9.	ta	25.0	Ambient temperature

Design Assistance

1. TPS54610 Product Folder : http://www.ti.com/product/TPS54610 : contains the data sheet and other resources.