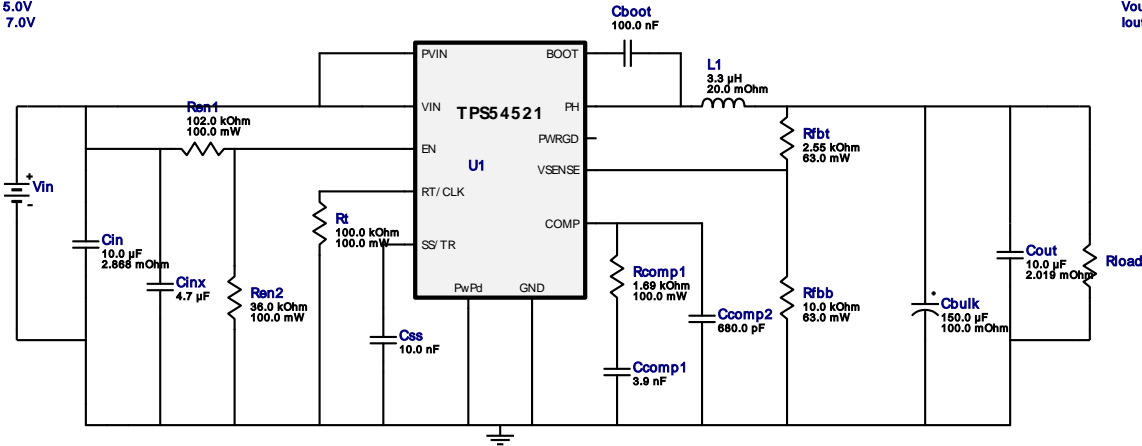


**WEBENCH<sup>®</sup> Design Report**

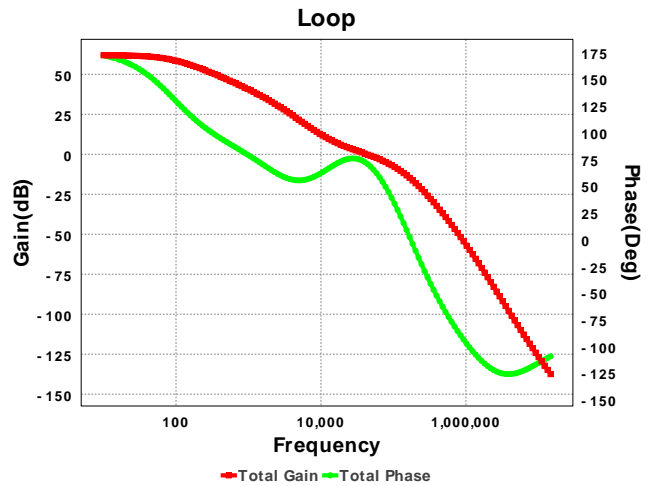
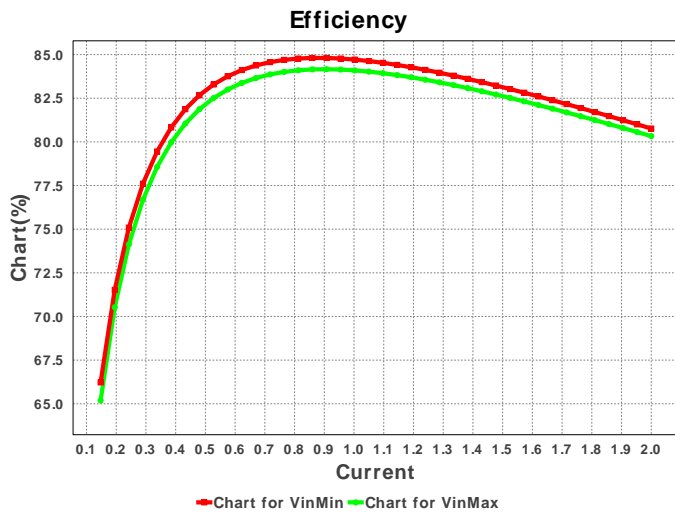
 Design : 4166583/26 TPS54521RHLLR  
 TPS54521RHLLR 5.0V-7.0V to 1.00V @ 2.0A

 VinMin = 5.0V  
 VinMax = 7.0V

 Vout = 1.0V  
 Iout = 2.0A

**Electrical BOM**

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0603C104J3RAC Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm <sup>2</sup>
2.	Cbulk	AVX	TPSD157K010R0100 Series= TPS	Cap= 150.0 uF ESR= 100.0 mOhm VDC= 10.0 V IRMS= 1.102 A	1	\$0.98	7343-31 59 mm <sup>2</sup>
3.	Ccomp1	MuRata	GRM188R71E392KA01D Series= X7R	Cap= 3.9 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm <sup>2</sup>
4.	Ccomp2	MuRata	GRM1555C1E681JA01D Series= C0G/NP0	Cap= 680.0 pF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm <sup>2</sup>
5.	Cin	TDK	C5750X7R1H106M Series= X7R	Cap= 10.0 uF ESR= 2.868 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.68	2220 54 mm <sup>2</sup>
6.	Cinx	MuRata	GRM21BC81E475KA12L Series= 379	Cap= 4.7 uF VDC= 25.0 V IRMS= 0.0 A	1	\$0.04	0805 7 mm <sup>2</sup>
7.	Cout	TDK	C4532X7R1E106M Series= X7R	Cap= 10.0 uF ESR= 2.019 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.35	1812 23 mm <sup>2</sup>
8.	Css	Kemet	C0603C103K1RACTU Series= X7R	Cap= 10.0 nF VDC= 100.0 V IRMS= 0.0 A	1	\$0.02	0603 5 mm <sup>2</sup>
9.	L1	TDK	SLF7045T-3R3M2R5-PF	L= 3.3 uH DCR= 20.0 mOhm	1	\$0.45	SLF7045 81 mm <sup>2</sup>
10.	Rcomp1	Vishay-Dale	CRCW06031K69FKEA Series= CRCW..e3	Res= 1.69 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm <sup>2</sup>

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Ren1	Vishay-Dale	CRCW0603102KFKEA Series= CRCW..e3	Res= 102.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm <sup>2</sup>
12.	Ren2	Vishay-Dale	CRCW060336K0JNEA Series= CRCW..e3	Res= 36.0 kOhm Power= 100.0 mW Tolerance= 5.0%	1	\$0.01	0603 5 mm <sup>2</sup>
13.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
14.	Rfbt	Vishay-Dale	CRCW04022K55FKED Series= CRCW..e3	Res= 2.55 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
15.	Rt	Vishay-Dale	CRCW0603100KFKEA Series= CRCW..e3	Res= 100.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm <sup>2</sup>
16.	U1	Texas Instruments	TPS54521RHLR	Switcher	1	\$1.02	S-PVQFN-N14 22 mm <sup>2</sup>



### Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	860.0 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	53.0 mA	Current	Output capacitor RMS ripple current
3.	IC Irms	2.01 A	Current	Calculated current across IC
4.	L Ipp Max	752.0 mA	Current	Inductor Peak to Peak Current calculated Max
5.	L Ipp Min	693.0 mA	Current	Inductor Peak to Peak Current calculated Min
6.	L1 Irms	2.01 A	Current	Inductor ripple current
7.	BOM Count	16	General	Total Design BOM count
8.	FootPrint	287.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
9.	Frequency	495.0 kHz	General	Switching frequency
10.	IC Tolerance	24.0 mV	General	IC Feedback Tolerance
11.	Pout	2.0 W	General	Total output power
12.	Total BOM	\$3.63	General	Total BOM Cost
13.	Cin Vdrop	7.04 V	Op_Point	Calculated voltage across input cap
14.	Cout Vdrop	1.0 V	Op_Point	Calculated voltage across output capacitor
15.	ESR Zero Freq	9.724 kHz	Op_Point	ESR Zero Frequency
16.	IC Vdrop	7.04 V	Op_Point	Calculated voltage across IC
17.	LC Conner Freq	6.926 kHz	Op_Point	LC conner frequency
18.	Vout OP	1.0 V	Op_Point	Operational Output Voltage
19.	Cross Freq	42.774 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	16.9 %	Op_point	Duty cycle
21.	Efficiency	80.33 %	Op_point	Steady state efficiency
22.	Gain Marg	-15.669 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	39.0 degC	Op_point	IC junction temperature
24.	IOUT_OP	2.0 A	Op_point	Iout operating point
25.	Phase Marg	72.431 deg	Op_point	Bode Plot Phase Margin
26.	VIN_OP	7.0 V	Op_point	Vin operating point
27.	Vout p-p	75.2 mV	Op_point	Peak-to-peak output ripple voltage

#	Name	Value	Category	Description
28.	Cin Pd	2.0 mW	Power	Input capacitor power dissipation
29.	Cout Pd	280.0 $\mu$ W	Power	Output capacitor power dissipation
30.	IC Pd	408.0 mW	Power	IC power dissipation
31.	M1 Rdson Max	84.0 mOhm	Power	High side FET Rdson max
32.	M1 Rdson Min	82.0 mOhm	Power	High side FET Rdson min
33.	M2 Rdson Max	68.0 mOhm	Power	Low side FET Rdson Max
34.	M2 Rdson Min	68.0 mOhm	Power	Low side FET Rdson Min
35.	Total Pd	408.0 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	7.0	Maximum input voltage
4.	VinMin	5.0	Minimum input voltage
5.	Vout	1.0	Output Voltage
6.	Vout1	1.0	Output Voltage #1
7.	base_pn	TPS54521	Texas Instruments Base Part Number
8.	source	DC	Input Source Type
9.	ta	30.0	Ambient temperature

## Design Assistance

1. TPS54521 Product Folder : <http://www.ti.com/product/TPS54521> : contains the data sheet and other resources.

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

**You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.**

Use of Texas Instruments' WEBENCH simulation tools is subject to [Texas Instruments' Site Terms and Conditions of Use](#). Prototype boards based on WEBENCH created designs are provided AS IS without warranty of any kind for evaluation and testing purposes and are subject to the terms of the [Evaluation License Agreement](#).