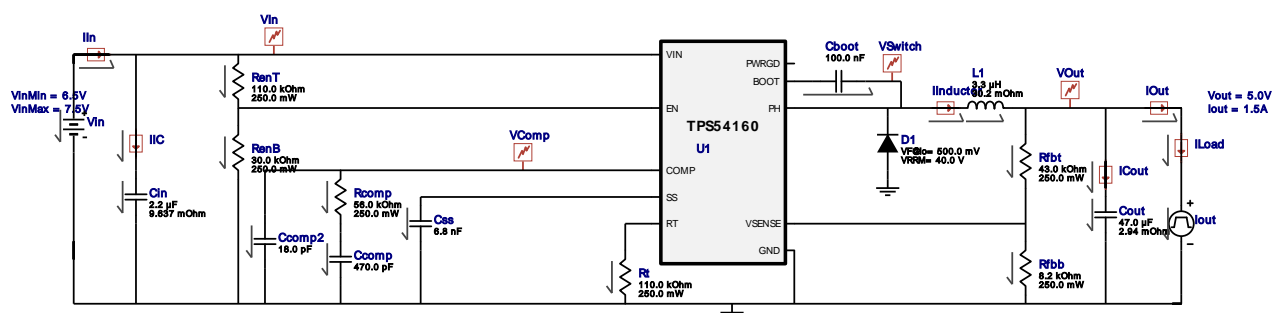




## WEBENCH® Electrical Simulation Report



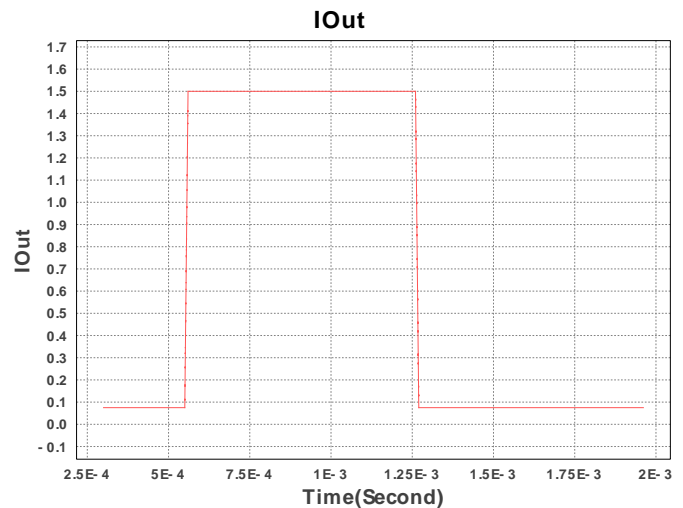
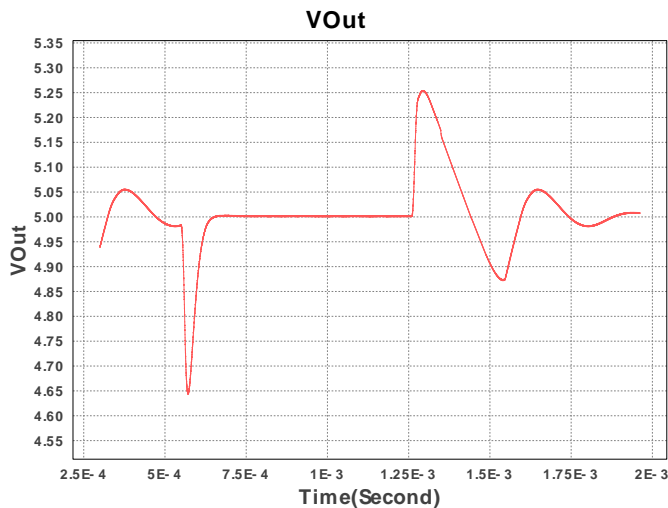
## Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm <sup>2</sup>
2.	Ccomp	Yageo America	CC0805KRX7R9BB471 Series= X7R	Cap= 470.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
3.	Ccomp2	Kemet	C0805C180K5GACTU Series= C0G/NP0	Cap= 18.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
4.	Cin	MuRata	GRM188R61A225KE34D Series= X5R	Cap= 2.2 µF ESR= 9.637 mOhm VDC= 10.0 V IRMS= 1.243 A	1	\$0.02	0603 5 mm <sup>2</sup>
5.	Cout	TDK	C2012X5R1A476M125AC Series= X5R	Cap= 47.0 µF ESR= 2.94 mOhm VDC= 10.0 V IRMS= 3.805 A	1	\$0.29	0805 7 mm <sup>2</sup>
6.	Css	Yageo America	CC0805KRX7R9BB682 Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
7.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.12	SMA 37 mm <sup>2</sup>
8.	L1	Bourns	SRN6045-3R3Y	L= 3.3 µH DCR= 30.2 mOhm	1	\$0.17	SRN6045 64 mm <sup>2</sup>
9.	Rcomp	Yageo America	RC1206FR-0756KL Series= ?	Res= 56.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	1206 11 mm <sup>2</sup>
10.	RenB	Yageo America	RC1206FR-0730KL Series= ?	Res= 30.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	1206 11 mm <sup>2</sup>
11.	RenT	Panasonic	ERJ-8ENF1103V Series= ERJ-8E	Res= 110.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	1206 11 mm <sup>2</sup>
12.	Rfbb	Yageo America	RC1206FR-078K2L Series= ?	Res= 8.2 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	1206 11 mm <sup>2</sup>
13.	Rfbb	Yageo America	RC1206FR-0743KL Series= ?	Res= 43.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	1206 11 mm <sup>2</sup>

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
14.	Rt	Vishay-Dale	CRCW1206110KFKEA Series= CRCW..e3	Res= 110.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm <sup>2</sup>
15.	U1	Texas Instruments	TPS54160DGQR	Switcher	1	\$1.35	 S-PDSO-G10 24 mm <sup>2</sup>

## Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cboot	IC	Initial Voltage	6 V
2.	Cout	IC	Initial Voltage	5.0 V
3.	Css	IC	Initial Voltage	1.55 V
4.	L1	IC	Initial Current	1.5 A
5.	Iout	signal_type	Signal Type	PULSE
		I1	Initial Current	0.075 A
		I2	Peak Current	1.5 A
		Td	Initial Delay Time	5.5E-4 Sec
		Tr	Rise Time	10u Sec
		Tf	Fall Time	0.00001 Sec
		Pw	Pulse Width	0.0007 Sec



## Design Inputs

#	Name	Value	Description
1.	Iout	1.5 A	Maximum Output Current
2.	VinMax	7.5 V	Maximum input voltage
3.	VinMin	6.5 V	Minimum input voltage
4.	Vout	5.0 V	Output Voltage
5.	base_pn	TPS54160	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0 degC	Ambient temperature

## Operating Values

#	Name	Value	Category	Description
1.	BOM Count	15		Total Design BOM count
2.	Total BOM	\$2.05		Total BOM Cost
3.	Cin IRMS	516.931 mA	Current	Input capacitor RMS ripple current
4.	Cout IRMS	156.176 mA	Current	Output capacitor RMS ripple current
5.	IC Ipk	1.771 A	Current	Peak switch current in IC
6.	Iin Avg	1.139 A	Current	Average input current
7.	L Ipp	541.01 mA	Current	Peak-to-peak inductor ripple current
8.	FootPrint	225.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
9.	Frequency	1.013 MHz	General	Switching frequency
10.	Mode	CCM	General	Conduction Mode
11.	Pout	7.5 W	General	Total output power

#	Name	Value	Category	Description
12.	D1 Tj	45.821 degC	Op_Point	D1 junction temperature
13.	Low Freq Gain	84.563 dB	Op_Point	Gain at 1Hz
14.	Vout Actual	4.995 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	28.534 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	72.347 %	Op_point	Duty cycle
18.	Efficiency	87.799 %	Op_point	Steady state efficiency
19.	Gain Marg	-22.44 dB	Op_point	Bode Plot Gain Margin
20.	IC Tj	80.418 degC	Op_point	IC junction temperature
21.	ICThetaJA	62.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	1.5 A	Op_point	Iout operating point
23.	Phase Marg	66.847 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	7.5 V	Op_point	Vin operating point
25.	Vout p-p	3.119 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	2.575 mW	Power	Input capacitor power dissipation
27.	Cout Pd	71.709 $\mu$ W	Power	Output capacitor power dissipation
28.	Diode Pd	158.209 mW	Power	Diode power dissipation
29.	IC Pd	806.681 mW	Power	IC power dissipation
30.	L Pd	74.745 mW	Power	Inductor power dissipation
31.	Total Pd	1.042 W	Power	Total Power Dissipation
32.	Vout Tolerance	2.714 %	Unknown	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

## Design Assistance

1. **TPS54160** Product Folder : <http://www.ti.com/product/TPS54160> : contains the data sheet and other resources.

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