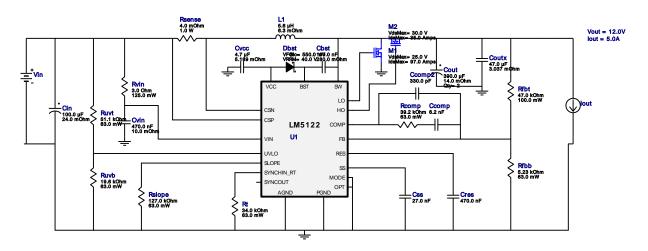


VinMin = 5.0V VinMax = 10.0V Vout = 12.0V lout = 5.0A Device = LM5122MH/NOPB Topology = Boost Created = 2017-06-12 04:53:45.125 BOM Cost = \$6.81 BOM Count = 25 Total Pd = 4.76W

WEBENCH® Design Report

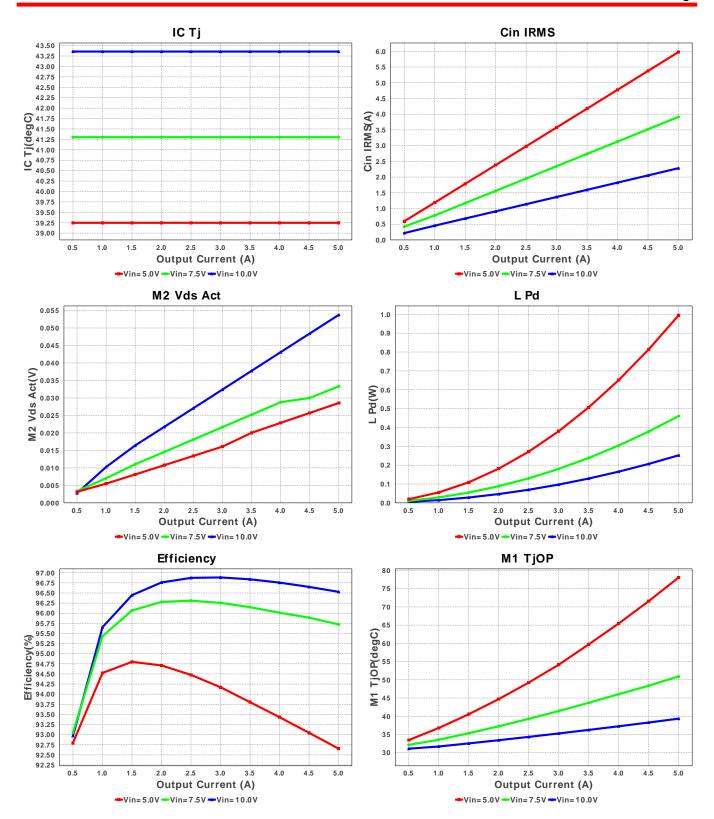
Design: 4573922/48 LM5122MH/NOPB LM5122MH/NOPB 5.0V-10.0V to 12.00V @ 5.0A

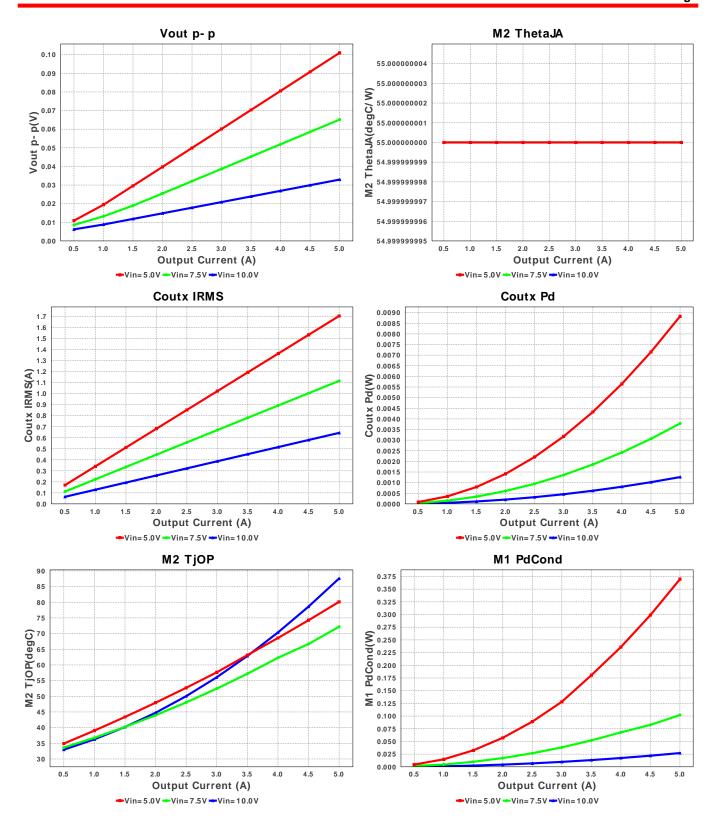


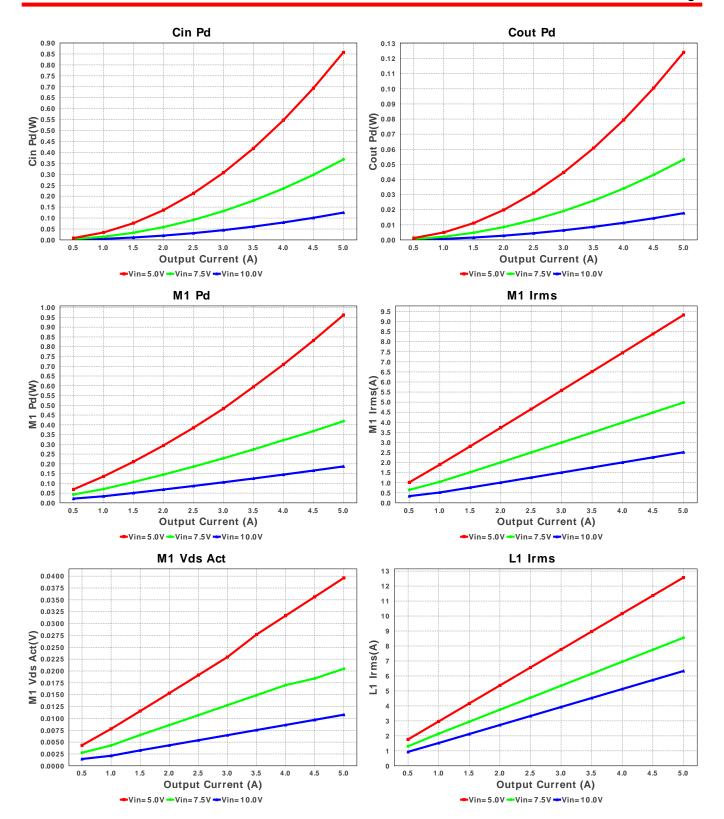
Electrical BOM

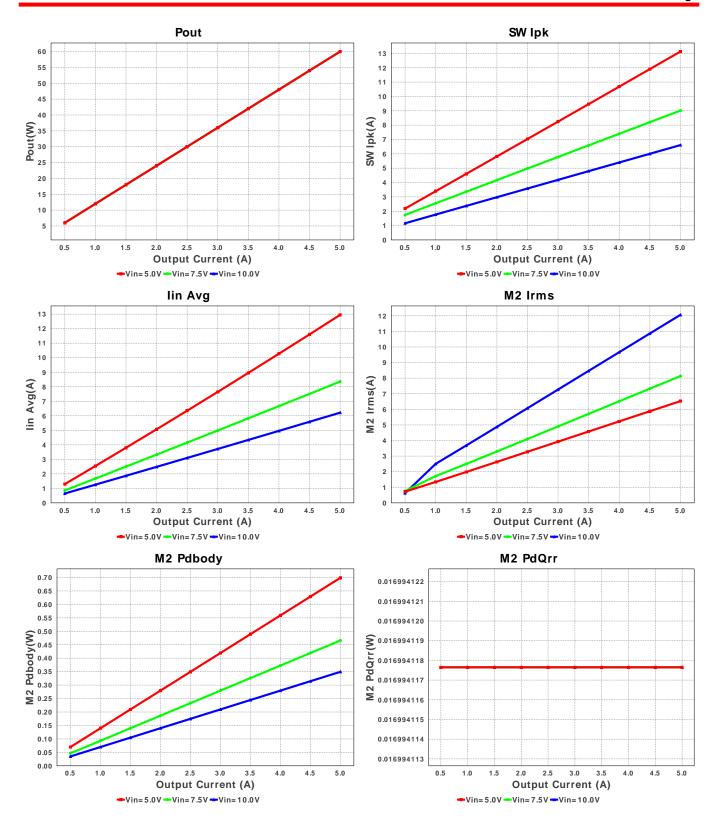
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	Ccomp	MuRata	GRM2195C1H622JA01D Series= C0G/NP0	Cap= 6.2 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.05	0805 7 mm ²
3.	Ccomp2	Samsung Electro- Mechanics	CL21C331JBANFNC Series= C0G/NP0	Cap= 330.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
4.	Cin	Panasonic	16SVPC100M Series= SVPC	Cap= 100.0 uF ESR= 24.0 mOhm VDC= 16.0 V IRMS= 2.49 A	1	\$0.31	SM_RADIAL_6.3AMM 80 mm²
5.	Cout	Panasonic	20SVPF390M Series= ?	Cap= 390.0 uF ESR= 14.0 mOhm VDC= 20.0 V IRMS= 4.95 A	2	\$0.66	CAPSMT_62_E12 106 mm ²
6.	Coutx	MuRata	GRM32ER61C476ME15L Series= X5R	Cap= 47.0 uF ESR= 3.037 mOhm VDC= 16.0 V IRMS= 4.59346 A	1	\$0.26	1210_280 15 mm ²
7.	Cres	Taiyo Yuden	TMK212BJ474KD-T Series= X5R	Cap= 470.0 nF VDC= 20.0 V IRMS= 0.0 A	1	\$0.02	0805 7 mm ²
8.	Css	MuRata	GRM155R61A273KA01D Series= X5R	Cap= 27.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
9.	Cvcc	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	\$0.03	0805 7 mm ²

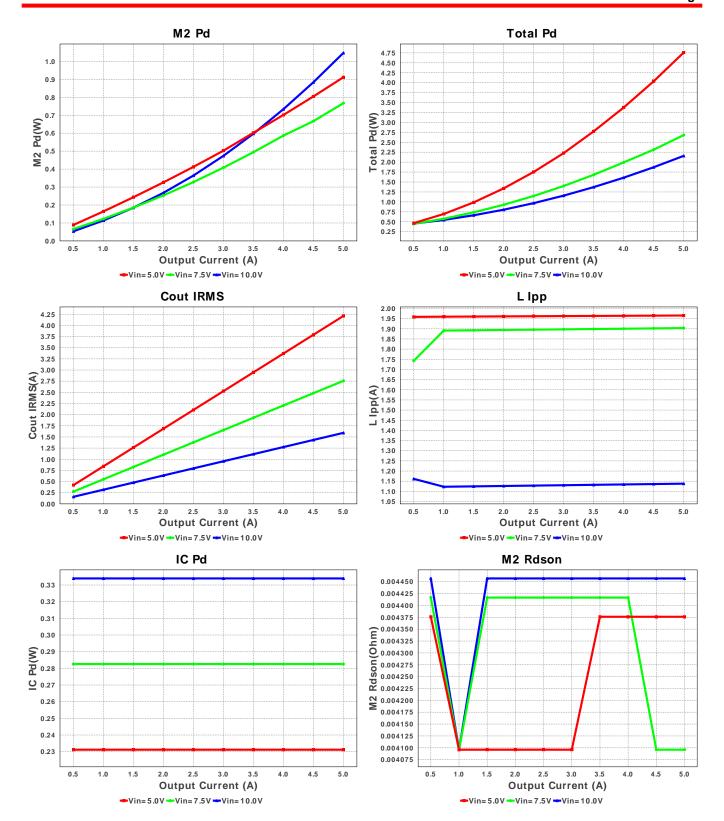
# Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10. Cvin	MuRata	GRM188R71C474KA88D Series= X7R	Cap= 470.0 nF ESR= 10.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	0603 5 mm ²
11. Dbst	Fairchild Semiconductor	SS24FL	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.07	SOD-123F 12 mm ²
12. L1	Coilcraft	XAL1010-562MEB	L= 5.6 µH DCR= 6.3 mOhm	1	\$1.71	
13. M1	Texas Instruments	CSD16322Q5	VdsMax= 25.0 V IdsMax= 97.0 Amps	1	\$0.40	TRANS_NexFET_Q5 55 mm²
14. M2	Texas Instruments	CSD17577Q3A	VdsMax= 30.0 V IdsMax= 35.0 Amps	1	\$0.21	DNH0008A 18 mm ²
15. Rcomp	Vishay-Dale	CRCW040239K2FKED Series= CRCWe3	Res= 39.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
16. Rfbb	Vishay-Dale	CRCW04025K23FKED Series= CRCWe3	Res= 5.23 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
17. Rfbt	Yageo America	RC0603FR-0747KL Series= ?	Res= 47.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
18. Rsense	Panasonic	ERJ-M1WSF4M0U Series= ERJ	Res= 4.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	\$0.14	2512 43 mm ²
19. Rslope	Vishay-Dale	CRCW0402127KFKED Series= CRCWe3	Res= 127.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
20. Rt	Vishay-Dale	CRCW040234K0FKED Series= CRCWe3	Res= 34.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
21. Ruvb	Vishay-Dale	CRCW040219K6FKED Series= CRCWe3	Res= 19.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
22. Ruvt	Vishay-Dale	CRCW040251K1FKED Series= CRCWe3	Res= 51.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
23. Rvin	Yageo America	RC0805FR-073RL Series= ?	Res= 3.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²
24. U1	Texas Instruments	LM5122MH/NOPB	Switcher	1	\$2.16	
						MXA20A 71 mm ²

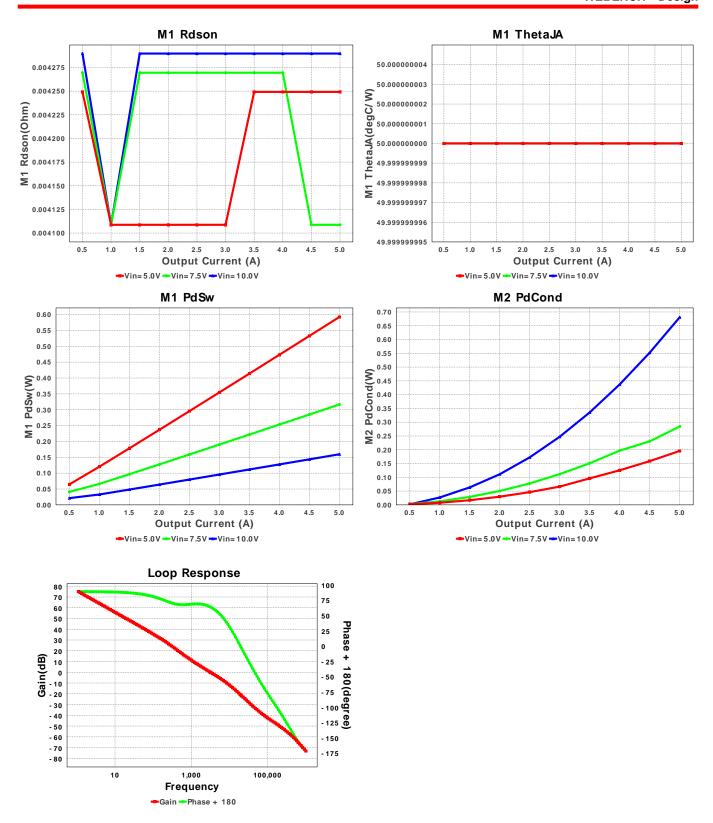












Operating Values

	#	Name	Value	Category	Description
Ī	1.	Cin IRMS	5.977 A	Current	Input capacitor RMS ripple current
	2.	Cout IRMS	4.211 A	Current	Output capacitor RMS ripple current
	3.	Coutx IRMS	1.705 A	Current	Output capacitor_x RMS ripple current
	4.	lin Avg	12.953 A	Current	Average input current
	5.	L lpp	1.966 A	Current	Peak-to-peak inductor ripple current
	6.	L1 Irms	12.567 A	Current	Inductor ripple current
	7.	M1 Irms	9.325 A	Current	MOSFET RMS ripple current
	8.	M2 Irms	6.526 A	Current	MOSFET RMS ripple current
	9.	SW lpk	13.127 A	Current	Peak switch current
	10.	BOM Count	25	General	Total Design BOM count
	11.	FootPrint	737.0 mm ²	General	Total Foot Print Area of BOM components

12. Frequency	#	Name	Value	Category	Description
13			** * *		· · · · · · · · · · · · · · · · · · ·
14. Mf Rdson 4,249 mOhm General Drain-Source On-resistance 15. Mf ThetaJA 50.0 degC/W General MOSFET junction-to-ambient thermal resistance 16. Mf Vds Act 39.623 mV General M Vds 17. Mz Rdson 4.376 mOhm General M Vds 18. MZ ThetaJA 55.0 degC/W General MOSFET junction-to-ambient thermal resistance 19. MZ Vds Act 28.559 mV General MOSFET junction-to-ambient thermal resistance 20. Mode CCM General Total output power 21. Pout 60.0 W General Total output power 22. Total BOM \$6.81 General Total output power 24. Vout Actual 11.984 V Op_Point Vout Actual calculated based on selected voltage divider resistors 25. Vout OP 12.0 V Op_Point Vout Actual calculated based on selected voltage divider resistors 26. Cross Freq 1.71 kHz Op_point Steady state efficiency 28. Gain Marg 1.72 kHz Op_point Bode plot crossover frequency 29. ICT j 39.248 degC Op_point					
15. M1 ThetaJA 50.0 degC/W General MOSFET junction-to-ambient thermal resistance M V ds Act 39.623 mV General Drain-Source On-resistance M V ds Act 28.559 mV General MOSFET junction-to-ambient thermal resistance M V ds Act 28.559 mV General M V ds M General Conduction Mode M General Total BOM Cost M General Total Compound M General Total BOM Cost M General M V ds M General M V					
16. M1 Vds Act 39,623 mV General M Vds 17. M2 Rdson 4.376 mOhm General Drain-Source On-resistance 18. M2 ThetaJA 55.0 degC/W General MOSFET junction-to-ambient thermal resistance 19. M2 Vds Act 28.559 mV General M Vds 20. Mode CCM General Conduction Mode 21. Pout 60.0 W General Total bom Cost 22. Total BOM \$6.81 General Total bom Cost 23. Low Freq Gain 74.267 dB Op Point Vout Actual calculated based on selected voltage divider resistors 24. Vout Actual 11.984 V Op Point Op Point Operational Output Voltage 25. Vout OP 12.0 V Op Point Op Point Operational Output Voltage 26. Cross Freq 1.71 kHz Op point Bode plot crossover frequency 27. Efficiency 92.644 % Op point Steady state efficiency 28. Gain Marg -17.804 dB Op p	15.	M1 ThetaJA			MOSFET junction-to-ambient thermal resistance
18. M2 ThetaJA 55.0 degC/W General M Vds M2 28.559 mV General M Vds M2 28.559 mV General M Vds M Vds Act 28.559 mV General Conduction Mode CCM General Total Double M Vds M Vds M General Total BOM Cost Double M S6.81 General Total BOM Cost Double M S6.82 General Total P Dower M Doser Double M S6.82 General Total P Dower M Doser Dower dissipation Double General Total P Dower M Doser Dower Doseption Double General Total P Dower Dower Doseption Double General Total P Dower Dower Doseption Double General Total P Dower Dower Dower Doseption Double General Total P Dower Dower Dower Doseption Double General Total P Dower D	16.	M1 Vds Act	ū	General	•
19. M2 Vds Act 28.559 mV General M Vds 20. Mode CCM General Conduction Mode 21. Pout 60.0 W General Total output power 22. Total BOM \$6.81 General Total BOM Cost 23. Low Freq Gain 74.267 dB Op_Point Gain at 10Hz 24. Vout Actual 11.984 V Op_Point Op_Point Actual Calculated based on selected voltage divider resistors 25. Vout OP 12.0 V Op_Point Op_Point Vout Actual Calculated based on selected voltage divider resistors 26. Cross Freq 1.71 kHz Op_point Op_point Governous Calculated Description of Calcul	17.	M2 Rdson	4.376 mOhm	General	Drain-Source On-resistance
19. M2 Vds Act 28.559 mV General Mode CCM General Conduction Mode 21. Pout 60.0 W General Total output power 22. Total BOM \$6.81 General Total BOM Cost 23. Low Freq Gain 74.267 dB Op_Point Vout Actual calculated based on selected voltage divider resistors 25. Vout OP 12.0 V Op_Point Op_Point Op_Point Vout Actual calculated based on selected voltage divider resistors 25. Vout OP 12.0 V Op_Point Op_Point Vout Actual calculated based on selected voltage divider resistors 25. Vout OP 12.0 V Op_Point Op_Point Vout Actual calculated based on selected voltage divider resistors 26. Cross Freq 1.71 kHz Op_Point Op_Point Mode Op_Point Mode 27. Efficiency 92.644 % Op_point Mode	18.	M2 ThetaJA	55.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
21. Pout 60.0 W General Total output power 22. Total BOM \$6.81 General Total BOM Cost 32. Low Freq Gain 74.267 dB Op_Point Gain at 10Hz 24. Vout Actual 11.984 V Op_Point Operational Output Voltage 25. Vout OP 12.0 V Op_Point Operational Output Voltage 26. Cross Freq 1.71 kHz Op_point Steady state efficiency 27. Efficiency 92.644 % Op_point Bode Plot Gain Margin 28. Gain Marg -17.804 dB Op_point Bode Plot Gain Margin 29. IC Tij 39.248 degC Op_point IC junction-to-ambient thermal resistance 30. ICThetaJA 40.0 degC/W Op_point IC junction-to-ambient thermal resistance 31. IOUT_OP 5.0 A Op_point IOut operating point	19.	M2 Vds Act	28.559 mV	General	
22. Total BOM \$6.81 General Op_Point Gain at 10Hz 24. Vout Actual 11.984 V Op_Point	20.	Mode	CCM	General	Conduction Mode
23. Low Freq Gain 74.267 dB Op_Point Gain at 10Hz 24. Vout Actual 11.984 V Op_Point Vout Actual calculated based on selected voltage divider resistors 25. Vout OP 12.0 V Op_Point Operational Output Voltage 26. Cross Freq 1.71 kHz Op_point Bode plot crossover frequency 27. Efficiency 92.644 % Op_point Bode plot Gain Margin 28. Gain Marg -17.804 dB Op_point IC gunction-to-ambient thermal resistance 29. IC Tj 39.248 degC Op_point IC junction-to-ambient thermal resistance 30. ICThetaJA 40.0 degC/W Op_point IC junction-to-ambient thermal resistance 31. IOUT_OP 5.0 A Op_point MI MOSFET junction temperature 32. M1 TjOP 78.094 degC Op_point MOSFET junction temperature 33. M2 TjOP 80.133 degC Op_point MOSFET junction temperature 34. Phase Marg 60.913 deg Op_point MOSFET junction temperature	21.	Pout	60.0 W	General	Total output power
24. Vout Actual 11.984 V Op_Point Steady state efficiency Steady state efficiency Steady state operature Ic junction temperature Ic junction temperat	22.	Total BOM	\$6.81	General	Total BOM Cost
25. Vout OP 12.0 V Op_Point Operational Output Voltage 26. Cross Freq 1.71 kHz Op_point Bode plot crossover frequency 27. Efficiency 92.644 % Op_point Steady state efficiency 28. Gain Marg -17.804 dB Op_point Bode Plot Gain Margin 29. IC Tj 39.248 degC Op_point IC junction temperature 30. ICThetaJA 40.0 degC/W Op_point IC junction temperature 31. IOUT_OP 5.0 A Op_point IOUT_OP 5.0 A OP_point IOUT_OP T8.094 degC OP_poin	23.	Low Freq Gain	74.267 dB	Op_Point	Gain at 10Hz
26. Cross Freq 1.71 kHz Op_point Efficiency 92.644 % Op_point Steady state efficiency 92.644 % Op_point Steady state efficiency 92.644 % Op_point Steady state efficiency 92.645 % Op_point Steady state efficiency 92.646 % Op_point Steady state efficiency 92.647 % Op_point Steady state efficiency 92.647 % Op_point IC junction stemperature 93.648 Steady State efficiency 94.648 Steady state efficiency 95.648 Steady state efficiency 96.649 Steady state efficiency 95.648 Steady state efficiency 96.649 Steady state efficiency steady state e	24.	Vout Actual	11.984 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
27. Efficiency 92.644 % Op_point Steady state efficiency 82. Gain Marg -17.804 dB Op_point Bode Plot Gain Margin 17.804 dB Op_point IC junction temperature 1	25.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
28. Gain Marg -17.804 dB Op_point Bode Plot Gain Margin 29. IC Tj 39.248 degC Op_point IC junction temperature 30. ICThetaJA 40.0 degC/W Op_point IC junction-to-ambient thermal resistance 31. IOUT_OP 5.0 A Op_point Iout operating point 32. M1 TjOP 78.094 degC Op_point M1 MOSFET junction temperature 33. M2 TjOP 80.133 deg Op_point MOSFET junction temperature 34. Phase Marg 60.913 deg Op_point MOSFET junction temperature 35. VIN_OP 5.0 V Op_point MOSFET junction temperature 36. Vout p-p 100.99 mV Op_point MOSFET junction temperature 37. Cin Pd 857.316 mW Op_point Vin operating point 38. Cout Pd 857.316 mW Power Input capacitor power dissipation 39. Coutx Pd 8.828 mW Power Output capacitor power dissipation 40. IC Pd 231.2 mW Power IC power dissipation 41. L Pd 995.016 mW Power MOSFET power dissipation	26.	Cross Freq	1.71 kHz		Bode plot crossover frequency
29. IC Tj 39.248 degC Op_point Op_point IC junction temperature 30. ICThetaJA 40.0 degC/W Op_point IC junction-to-ambient thermal resistance 31. IOUT_OP 5.0 A Op_point Op_point Ic junction-to-ambient thermal resistance 32. M1 TjOP 78.094 degC Op_point Op_point Op_point M1 MOSFET junction temperature 33. M2 TjOP 80.133 degC Op_point Op_poin	27.	Efficiency	92.644 %	Op_point	Steady state efficiency
30. ICThétaJA 40.0 degC/W Op_point IC junction-to-ambient thermal resistance 31. IOUT_OP 5.0 A Op_point Iout operating point 32. M1 TjOP 78.094 degC Op_point M1 MOSFET junction temperature 33. M2 TjOP 80.133 degC Op_point MOSFET junction temperature 34. Phase Marg 60.913 deg Op_point Bode Plot Phase Margin 35. VIN_OP 5.0 V Op_point Vin operating point 36. Vout p-p 100.99 mV Op_point Peak-to-peak output ripple voltage 37. Cin Pd 857.316 mW Power Input capacitor power dissipation 38. Cout Pd 124.135 mW Power Output capacitor power loss 40. IC Pd 231.2 mW Power IC power dissipation 41. L Pd 995.016 mW Power Inductor power dissipation 42. M1 Pd 961.876 mW Power Inductor power dissipation 43. M1 PdCond 369.477 mW Power MOSFET power dissipation 44. M1 PdSw 592.399 mW Power M1 MOSFET conduction losses 45. M2 Pd 911.512 mW Power M2 MOSFET conduction losses 47. M2 PdQrr 16.994 mW Power Synchronous Boost High Side Reverse Recovery 48. M2 Pdbody 698.824 mW Power Power dissipation hough lower FET 49. Total Pd 4.764 W Power Total Power Dissipation 50. Vout Tolerance 3.345 % Vout Tolerance (no load) and voltage divider	28.	Gain Marg	-17.804 dB	Op_point	Bode Plot Gain Margin
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32. M1 TjOP 78.094 degC Op_point M1 MOSFET junction temperature 33. M2 TjOP 80.133 degC Op_point MOSFET junction temperature 34. Phase Marg 60.913 deg Op_point Bode Plot Phase Margin 35. VIN_OP 5.0 V Op_point Vin operating point 36. Vout p-p 100.99 mV Op_point Peak-to-peak output ripple voltage 37. Cin Pd 857.316 mW Power Input capacitor power dissipation 38. Cout Pd 124.135 mW Power Output capacitor power dissipation 39. Coutx Pd 8.828 mW Power Output capacitor power dissipation 40. IC Pd 231.2 mW Power IC power dissipation 41. L Pd 995.016 mW Power Inductor power dissipation 42. M1 Pd 961.876 mW Power MOSFET power dissipation 43. M1 PdCond 369.477 mW Power MOSFET power dissipation 44. M1 PdSw 592.399 mW Power M1 MOSFET conduction losses 44. M1 PdSw 592.399 mW Power M2 MOSFET power dissipation 46. M2 PdCond 195.695 mW Power M2 MOSFET conduction losses 47. M2 PdDort 16.994 mW Power Synchronous Boost High Side Reverse Recovery 48. M2 Pdbody 698.824 mW Power Power dissipation trough lower FET 50. Vout Tolerance 3.345 % Vout Tolerance (no load) and voltage divider	30.	ICThetaJA	40.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
33. M2 TjOP 80.133 degC Op_point MOSFET junction temperature 34. Phase Marg 60.913 deg Op_point Bode Plot Phase Margin 35. VIN_OP 5.0 V Op_point Vin operating point 36. Vout p-p 100.99 mV Op_point Peak-to-peak output ripple voltage 37. Cin Pd 857.316 mW Power Input capacitor power dissipation 38. Cout Pd 124.135 mW Power Output capacitor power dissipation 39. Coutx Pd 8.828 mW Power Output capacitor_x power loss 40. IC Pd 231.2 mW Power IC power dissipation 41. L Pd 995.016 mW Power Inductor power dissipation 42. M1 Pd 961.876 mW Power MOSFET power dissipation 43. M1 PdCond 369.477 mW Power M1 MOSFET conduction losses 44. M1 PdSw 592.399 mW Power M1 MOSFET switching losses 45. M2 Pd 911.512 mW Power M2 MOSFET power dissipation 46. M2 PdCond 195.695 mW Power M2 MOSFET conduction losses 47. M2 PdQrr 16.994 mW Power Synchronous Boost High Side Reverse Recovery 48. M2 Pdbody 698.824 mW Power Power Dissipation Total Pd 4.764 W Power Dower Dissipation Total Power Dissipation Vout Tolerance (no load) and voltage divider	31.	IOUT_OP	5.0 A	Op_point	lout operating point
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37. Cin Pd 857.316 mW Power Input capacitor power dissipation 38. Cout Pd 124.135 mW Power Output capacitor power dissipation 39. Coutx Pd 8.828 mW Power Output capacitor_x power loss 40. IC Pd 231.2 mW Power IC power dissipation 41. L Pd 995.016 mW Power Inductor power dissipation 42. M1 Pd 961.876 mW Power MOSFET power dissipation 43. M1 PdCond 369.477 mW Power M1 MOSFET conduction losses 44. M1 PdSw 592.399 mW Power M1 MOSFET switching losses 45. M2 Pd 911.512 mW Power M2 MOSFET power dissipation 46. M2 PdCond 195.695 mW Power M2 MOSFET conduction losses 47. M2 PdQrr 16.994 mW Power Synchronous Boost High Side Reverse Recovery 48. M2 Pdbody 698.824 mW Power Power dissipation through lower FET 49. Total Pd 4.764 W Power Total Power Dissipation 50. Vout Tolerance 3.345 % Vout Tolerance (no load) and voltage divider		_			
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			-	Power	
	50.	Vout Tolerance	3.345 %		

Design Inputs

#	Name	Value	Description
1.	lout	5.0	Maximum Output Current
2.	VinMax	10.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	12.0	Output Voltage
5.	base_pn	LM5122	Base Product Number
6.	source	DC	Input Source Type
7.	Та	30.0	Ambient temperature

Design Assistance

- 1. The LM5122 is a wide range boost controller which is operable in an ultra wide input range of 4.5 to 65V. A boost regulator can maintain regulation for input voltages lower than the output voltage.
- 2. LM5122 Product Folder: http://www.ti.com/product/LM5122: contains the data sheet and other resources.

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