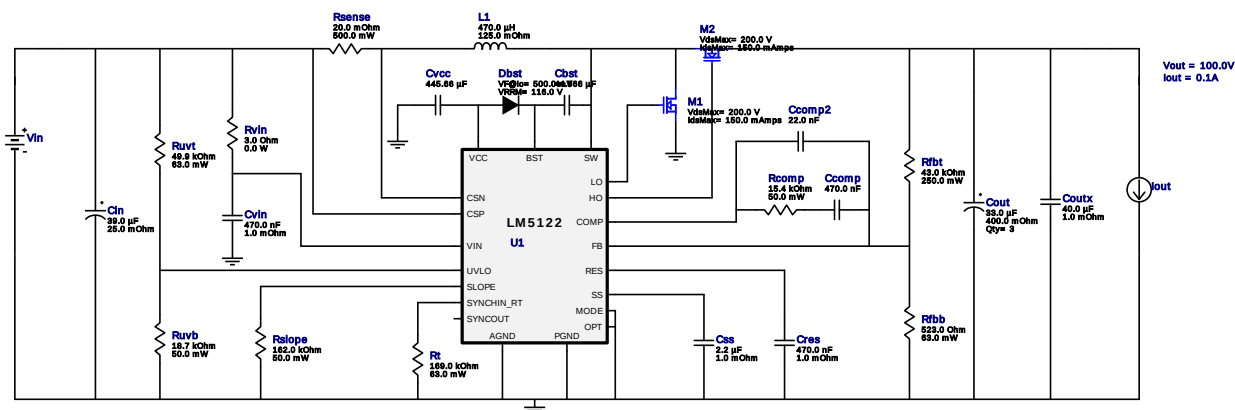
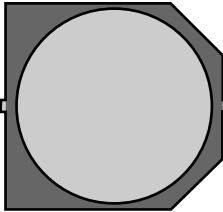


Design : 198 LM5122MH/NOPB
LM5122MH/NOPB 5V-30V to 100.00V @ 0.1A

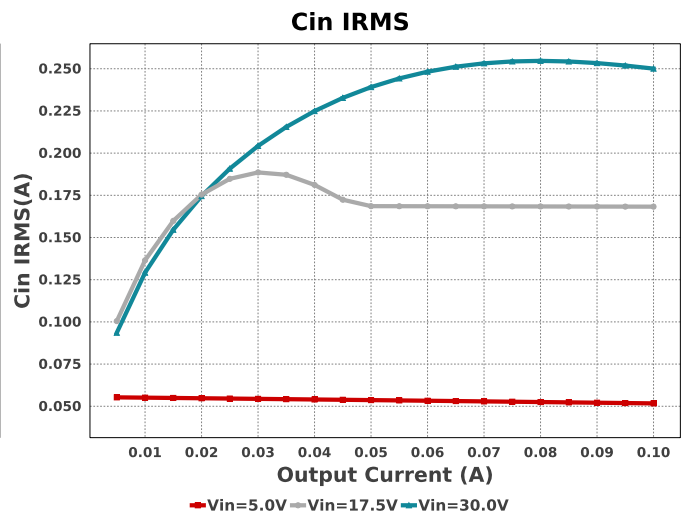
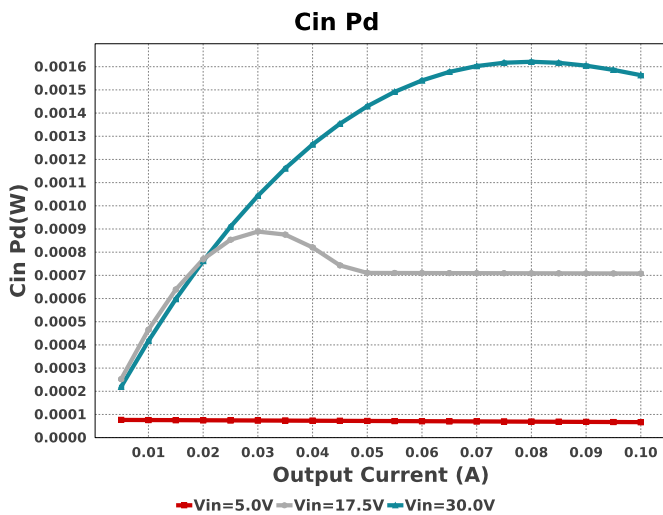
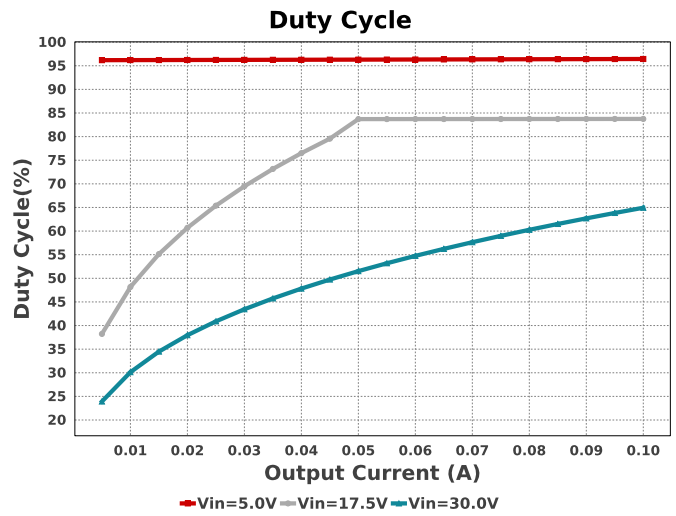
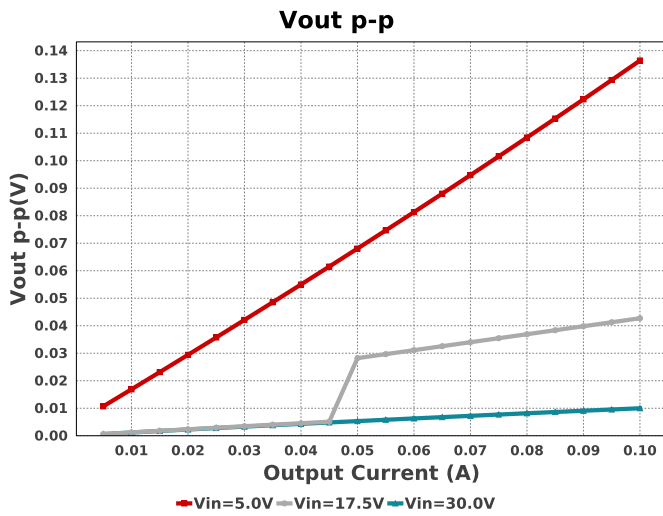
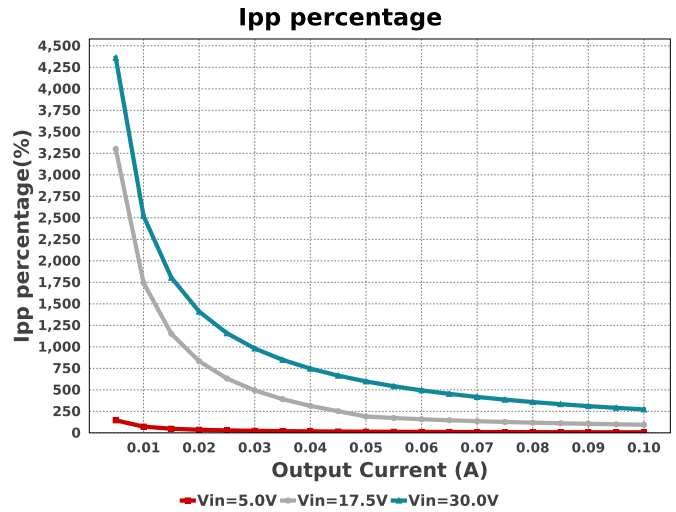
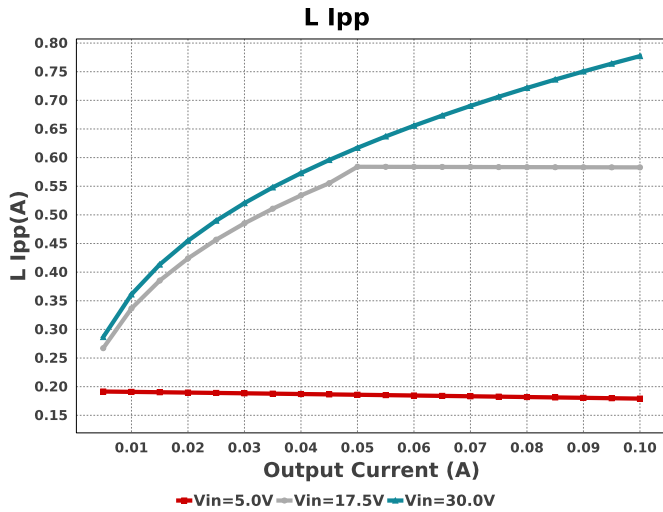


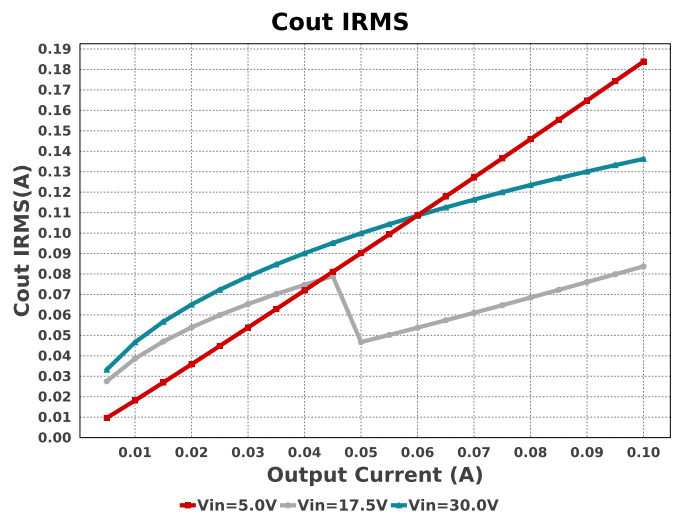
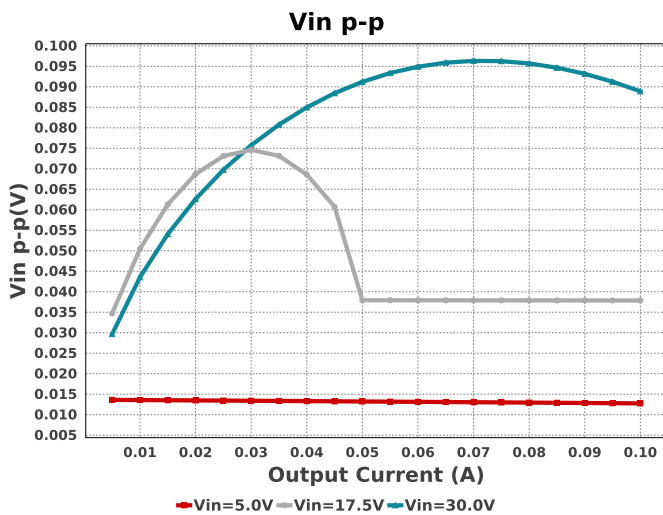
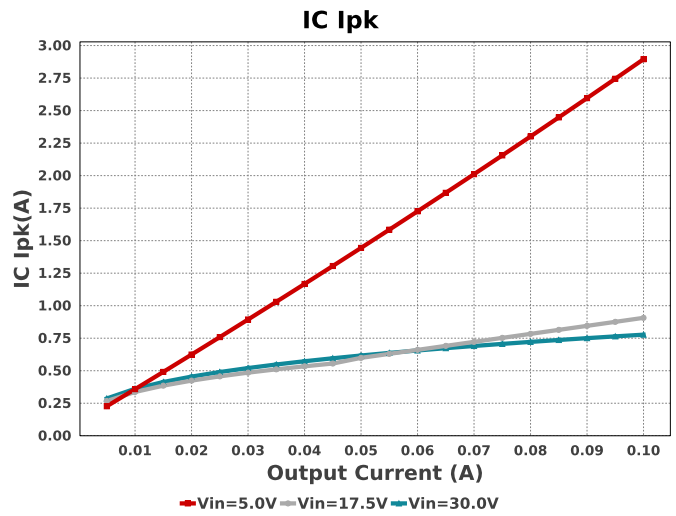
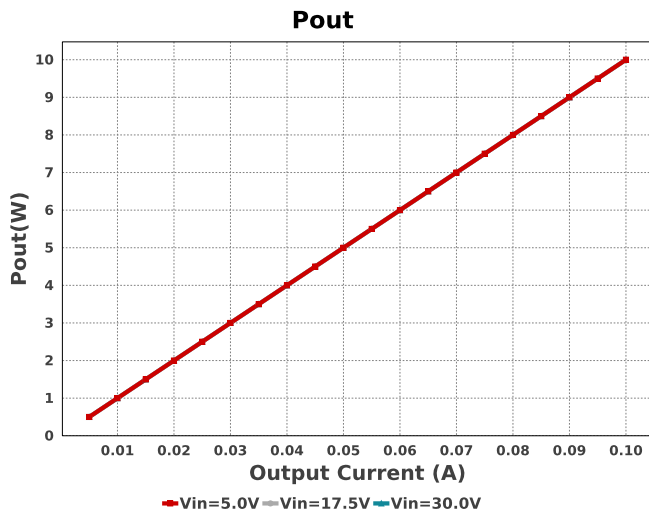
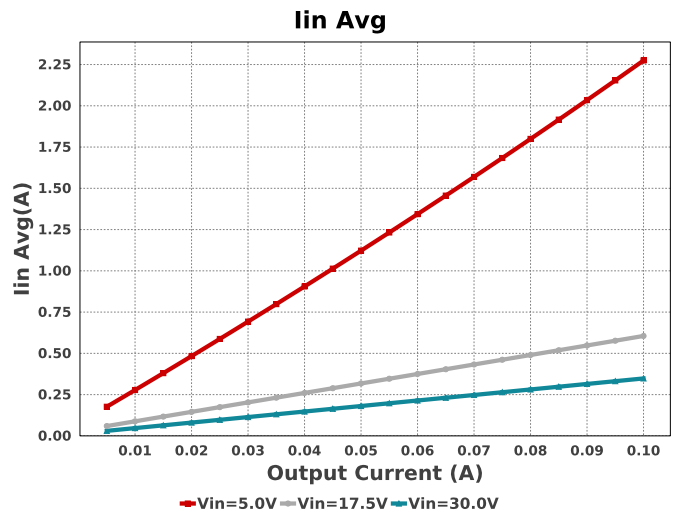
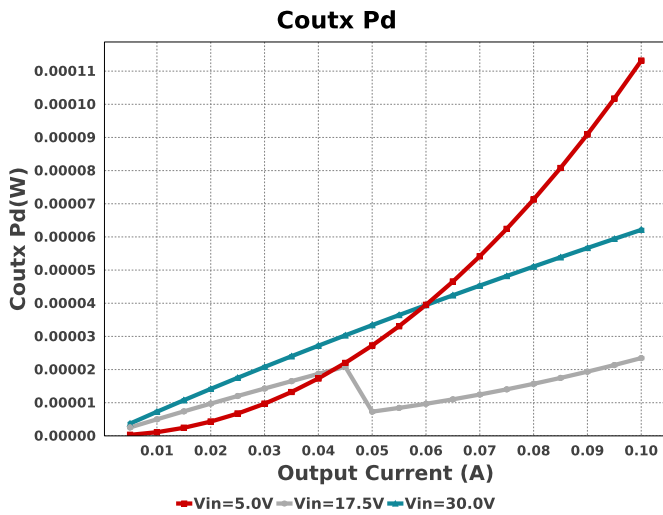
LM5122 Design

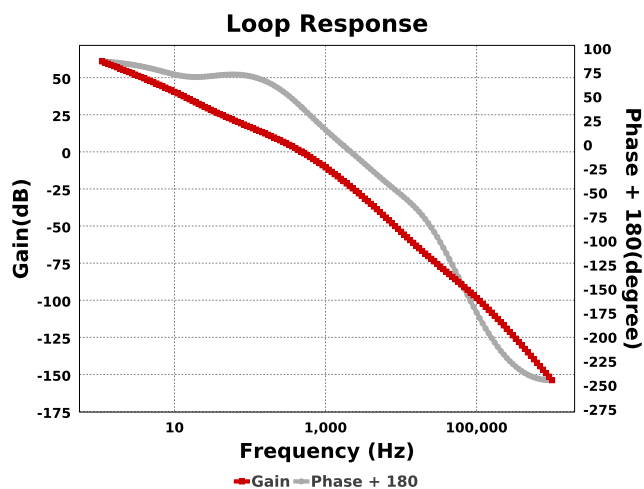
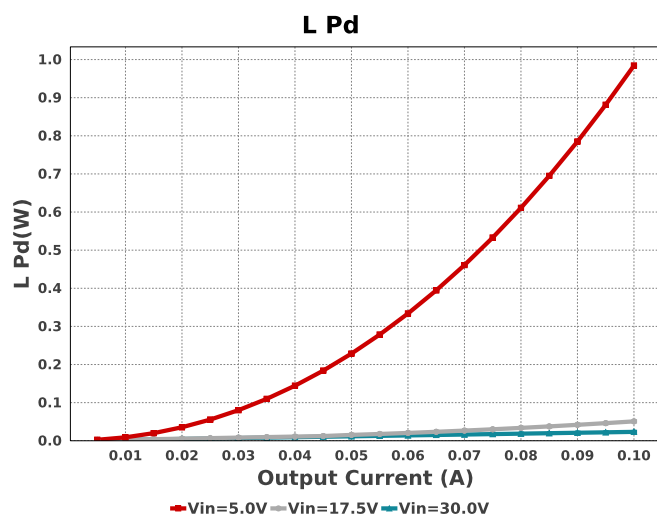
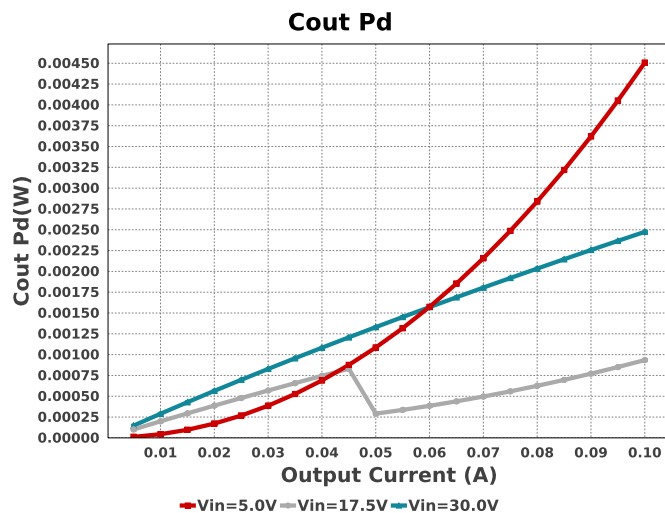
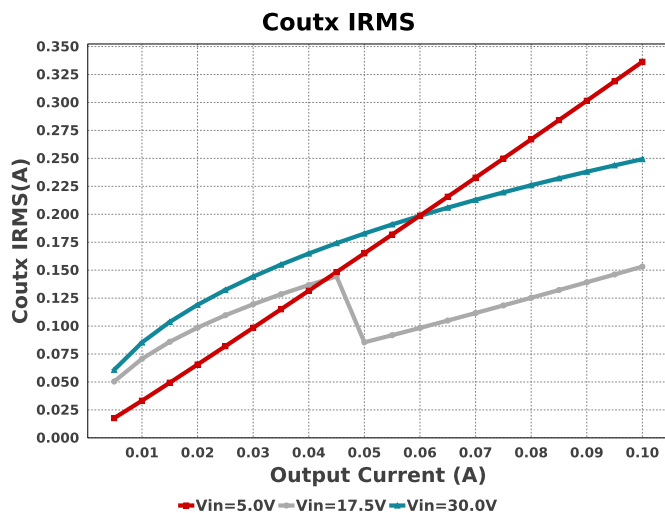
Electrical BOM

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cbst	CUSTOM	CUSTOM Series= ?	Cap= 44.566 uF VDC= 120.0 V IRMS= 0.0 A	1	NA	CUSTOM 0 mm ²
Ccomp	Panasonic	ECPU1C474MA5 Series= ECPU(A)	Cap= 470.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.20	 1206 11 mm ²
Ccomp2	TDK	CGA4J2C0G1H223J125AA Series= C0G/NP0	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.08	 0805 7 mm ²
Cin	Panasonic	50SVPF39M Series= SVPF	Cap= 39.0 uF ESR= 25.0 mOhm VDC= 50.0 V IRMS= 3.8 A	1	\$0.74	 CAPSMT_62_E12 106 mm ²
Cout	Panasonic	EEV-EB2E330SM Series= ?	Cap= 33.0 uF ESR= 400.0 mOhm VDC= 250.0 V IRMS= 560.0 mA	3	\$1.29	 EB_K16 483 mm ²
Coutx	CUSTOM	CUSTOM Series= ?	Cap= 40.0 uF ESR= 1.0 mOhm VDC= 120.0 V IRMS= 1000.0 kA	1	NA	CUSTOM 0 mm ²
Cres	Taiyo Yuden	TMK212BJ474KD-T Series= X5R	Cap= 470.0 nF ESR= 1.0 mOhm VDC= 20.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm ²

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Css	Taiyo Yuden	EMK212BJ225KG-T Series= X5R	Cap= 2.2 uF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm ²
Cvcc	CUSTOM	CUSTOM Series= ?	Cap= 445.66 uF VDC= 25.0 V IRMS= 0.0 A	1	NA	CUSTOM 0 mm ²
Cvin	MuRata	GRM21BR71H474KA88L Series= X7R	Cap= 470.0 nF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.08	 0805 7 mm ²
Dbst	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 116.0 V	1	NA	CUSTOM 0 mm ²
L1	MuRata	1447440C	L= 470.0 uH 125.0 mOhm	1	\$3.18	1447440C 1072 mm ²
M1	NA	IdealFET	VdsMax= 200.0 V IdsMax= 150.0 mAmps	1	NA	NA 0 mm ²
M2	NA	IdealFET	VdsMax= 200.0 V IdsMax= 150.0 mAmps	1	NA	NA 0 mm ²
Rcomp	Yageo	RC0201FR-0715K4L Series= ?	Res= 15.4 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm ²
Rfbb	Vishay-Dale	CRCW0402523RFKED Series= CRCW..e3	Res= 523.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
Rfbt	Yageo	RC1206FR-0743KL Series= ?	Res= 43.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.01	 1206 11 mm ²
Rsense	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.10	 1206 11 mm ²
Rslope	Yageo	RC0201FR-07162KL Series= ?	Res= 162.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm ²
Rt	Vishay-Dale	CRCW0402169KFKED Series= CRCW..e3	Res= 169.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
Ruvb	Yageo	RC0201FR-0718K7L Series= ?	Res= 18.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm ²
Rvvt	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
Rvin	CUSTOM	CUSTOM Series= ?	Res= 3.0 Ohm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm ²
U1	Texas Instruments	LM5122MH/NOPB	Switcher	1	\$2.09	 MXA20A 71 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	51.711 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	66.85 μ W	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	183.855 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	4.507 mW	Capacitor	Output capacitor power dissipation
5.	Coutx IRMS	336.377 mA	Capacitor	Output capacitor_x RMS ripple current
6.	Coutx Pd	113.15 μ W	Capacitor	Output capacitor_x power loss
7.	IC Ipk	2.895 A	IC	Peak switch current in IC
8.	IC Tolerance	18.0 mV	IC	IC Feedback Tolerance
9.	Iin Avg	2.259 A	IC	Average input current
10.	Ipp percentage	6.385 %	Inductor	Inductor ripple current percentage (with respect to average inductor current)
11.	L Ipp	179.13 mA	Inductor	Peak-to-peak inductor ripple current
12.	L Pd	984.17 mW	Inductor	Inductor power dissipation
13.	Cin Pd	66.85 μ W	Power	Input capacitor power dissipation
14.	Cout Pd	4.507 mW	Power	Output capacitor power dissipation
15.	Coutx Pd	113.15 μ W	Power	Output capacitor_x power loss
16.	L Pd	984.17 mW	Power	Inductor power dissipation
17.	BOM Count	26	System	Total Design BOM count
18.	Cross Freq	73.329 Hz	System	Bode plot crossover frequency
19.	Duty Cycle	96.436 %	System	Duty cycle
20.	FootPrint	3.033 k mm ²	System	Total Foot Print Area of BOM components
21.	Frequency	53.254 kHz	System	Switching frequency
22.	Gain Marg	-15.693 dB	System	Bode Plot Gain Margin
23.	Iout	100.0 mA	System	Iout operating point

#	Name	Value	Category	Description
24.	Low Freq Gain	55.813 dB	System Information	Gain at 1Hz
25.	Mode	CCM	System Information	Conduction Mode
26.	Phase Marg	57.028 deg	System Information	Bode Plot Phase Margin
27.	Pout	10.0 W	System Information	Total output power
28.	Total BOM	NA	System Information	Total BOM Cost
29.	Vin	5.0 V	System Information	Vin operating point
30.	Vin p-p	12.756 mV	System Information	Peak-to-peak input voltage
31.	Vout	100.0 V	System Information	Operational Output Voltage
32.	Vout Actual	99.862 V	System Information	Vout Actual calculated based on selected voltage divider resistors
33.	Vout Tolerance	3.526 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
34.	Vout p-p	136.418 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	100.0 m	Maximum Output Current
VinMax	30.0	Maximum input voltage
VinMin	5.0	Minimum input voltage
Vout	100.0	Output Voltage
base_pn	LM5122	Base Product Number
source	DC	Input Source Type
Ta	30.0	Ambient temperature

WEBENCH® Assembly

Component Testing

Some published data on components in datasheets such as Capacitor ESR and Inductor DC resistance is based on conservative values that will guarantee that the components always exceed the specification. For design purposes it is usually better to work with typical values. Since this data is not always available it is a good practice to measure the Capacitance and ESR values of C_{in} and C_{out} , and the inductance and DC resistance of $L1$ before assembly of the board. Any large discrepancies in values should be electrically simulated in WEBENCH to check for instabilities and thermally simulated in WebTHERM to make sure critical temperatures are not exceeded.

Soldering Component to Board

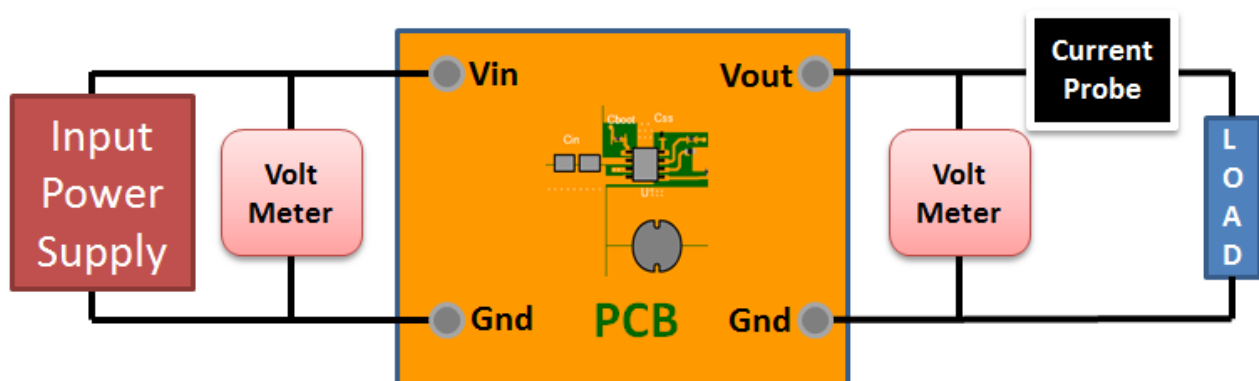
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. To solder the tab down to the board place the iron down on the board while resting against the tab, heating both surfaces simultaneously. Apply light pressure to the top of the plastic case until the solder flows around the part and the part is flush with the PCB. If the solder is not flowing around the board you may need a higher wattage iron (generally 25W to 30W is enough).

Initial Startup of Circuit

It is best to initially power up the board by setting the input supply voltage to the lowest operating input voltage 5.0V and set the input supply's current limit to zero. With the input supply off connect up the input supply to V_{in} and GND. Connect a digital volt meter and a load if needed to set the minimum load of the design from V_{out} and GND. Turn on the input supply and slowly turn up the current limit on the input supply. If the voltage starts to rise on the input supply continue increasing the input supply current limit while watching the output voltage. If the current increases on the input supply, but the voltage remains near zero, then there may be a short or a component misplaced on the board. Power down the board and visually inspect for solder bridges and recheck the diode and capacitor polarities. Once the power supply circuit is operational then more extensive testing may include full load testing, transient load and line tests to compare with simulation results.

Load Testing

The setup is the same as the initial startup, except that an additional digital voltmeter is connected between V_{in} and GND, a load is connected between V_{out} and GND and a current meter is connected in series between V_{out} and the load. The load must be able to handle at least rated output power + 50% (7.5 watts for this design). Ideally the load is supplied in the form of a variable load test unit. It can also be done in the form of suitably large power resistors. When using an oscilloscope to measure waveforms on the prototype board, the ground leads of the oscilloscope probes should be as short as possible and the area of the loop formed by the ground lead should be kept to a minimum. This will help reduce ground lead inductance and eliminate EMI noise that is not actually present in the circuit.



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. Master key : A0589A032B95D6C5[v1]
3. **LM5122 Product Folder** : <http://www.ti.com/product/LM5122> : contains the data sheet and other resources.

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