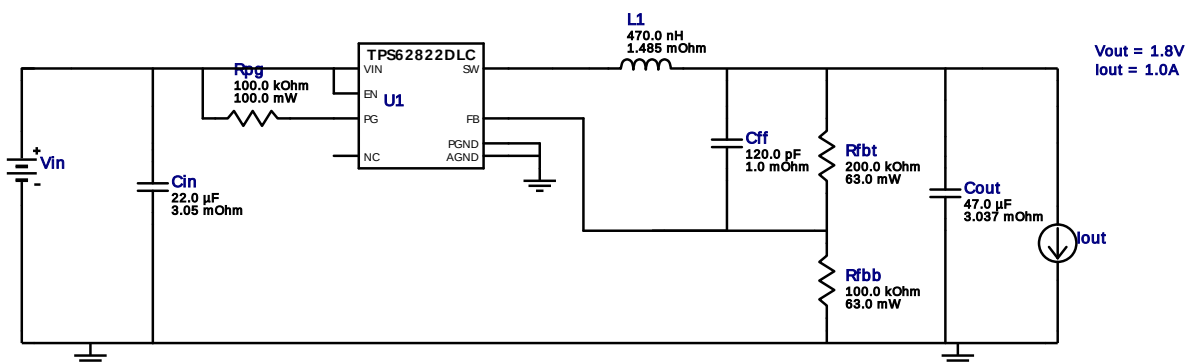


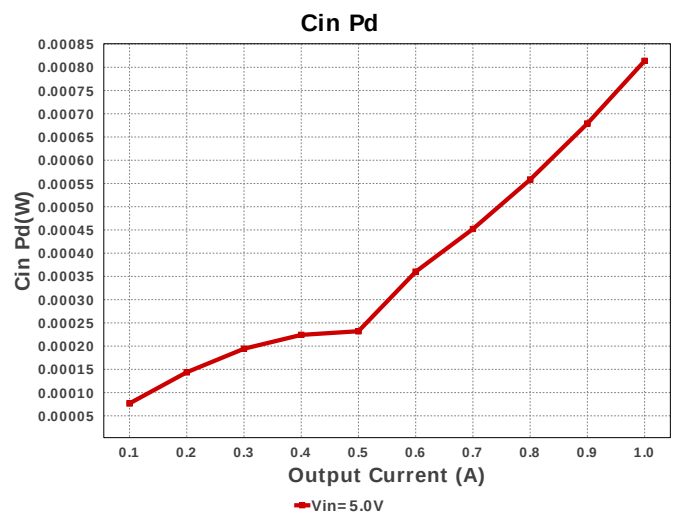
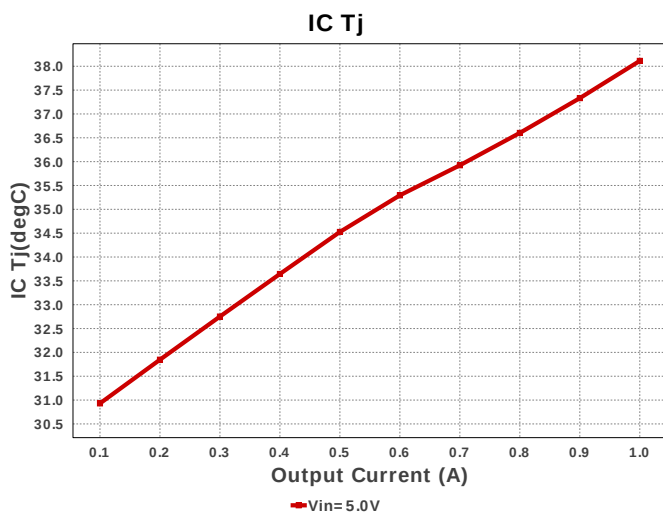
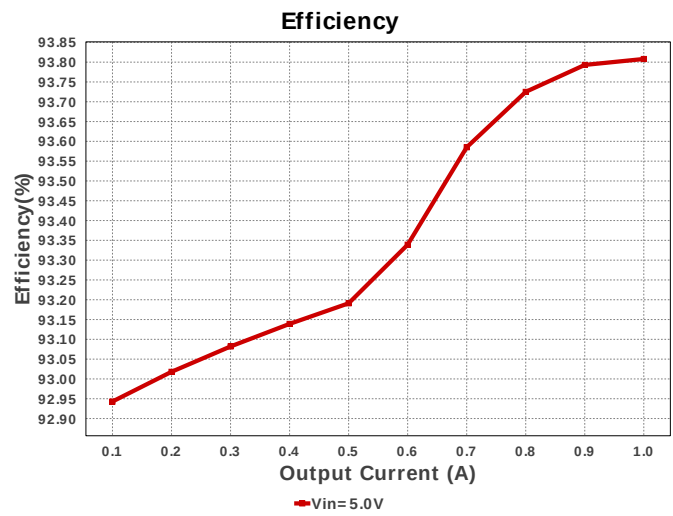
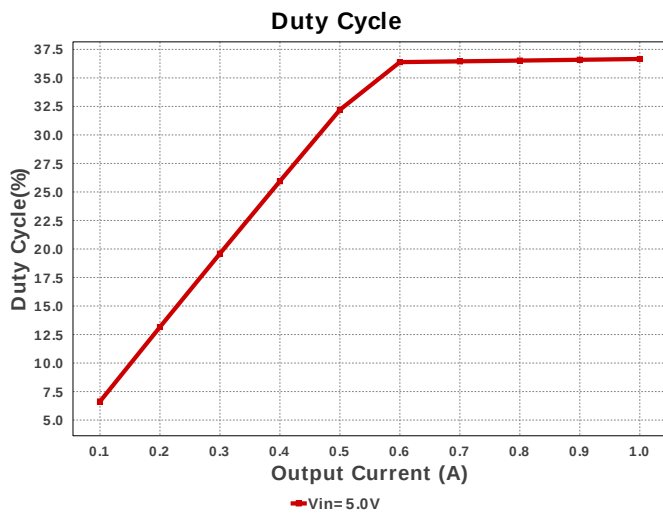
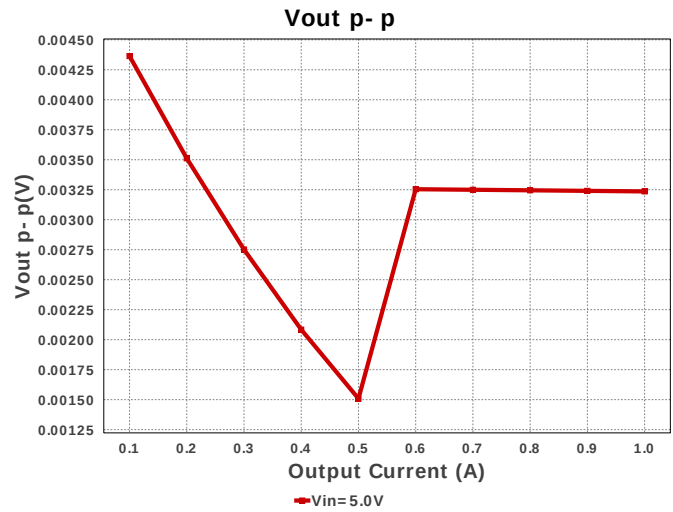
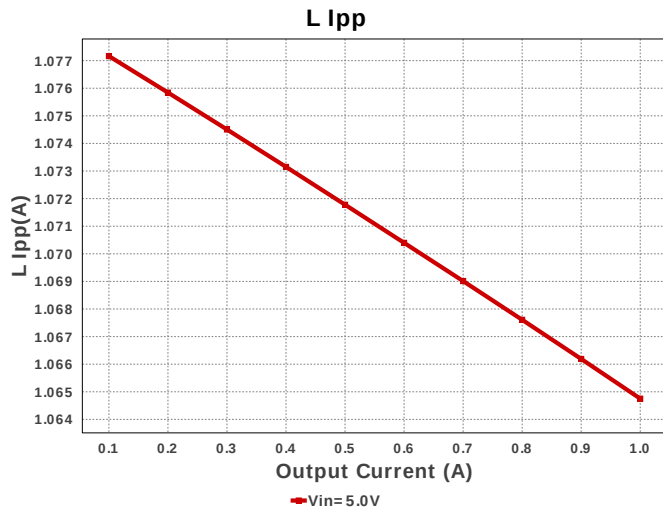
WEBENCH® Design Report

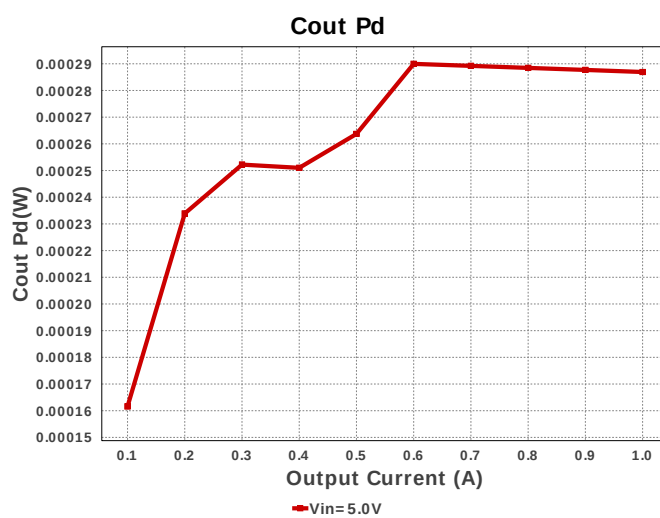
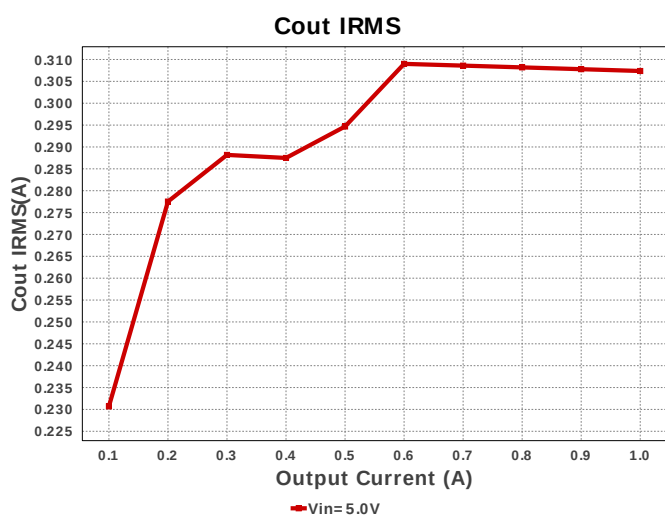
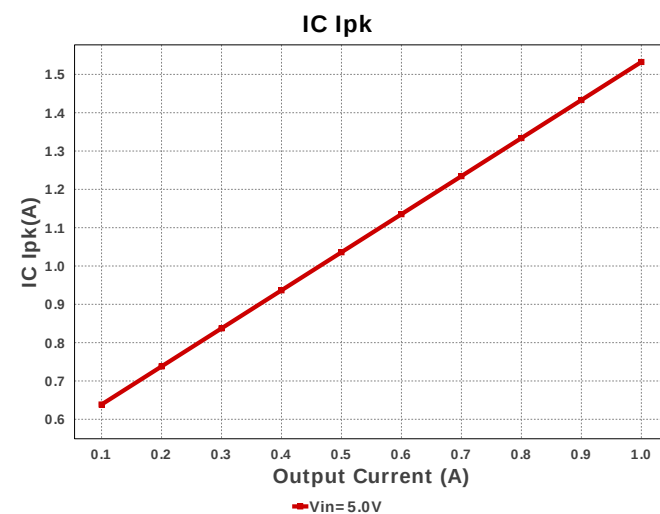
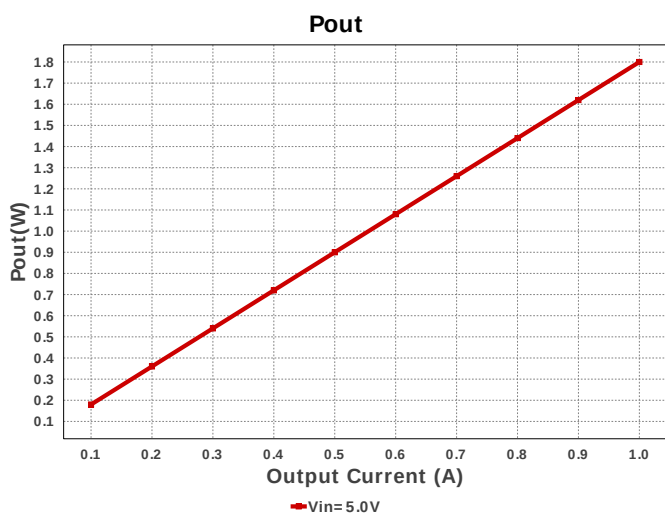
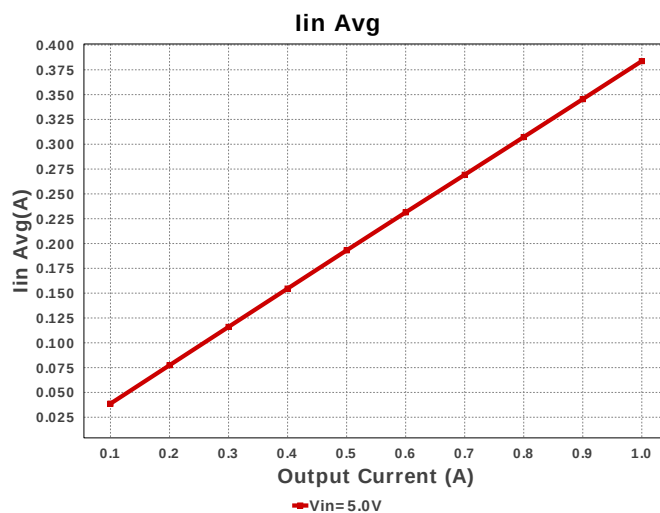
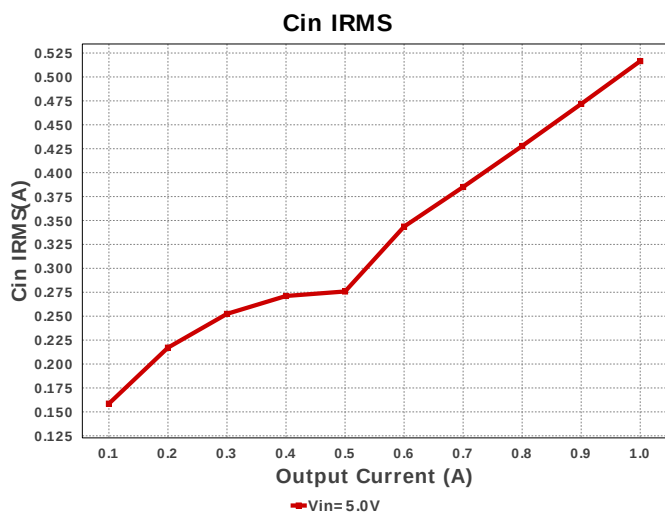
Design : 12 TPS62822DLCR
TPS62822DLCR 5V-5V to 1.80V @ 2A

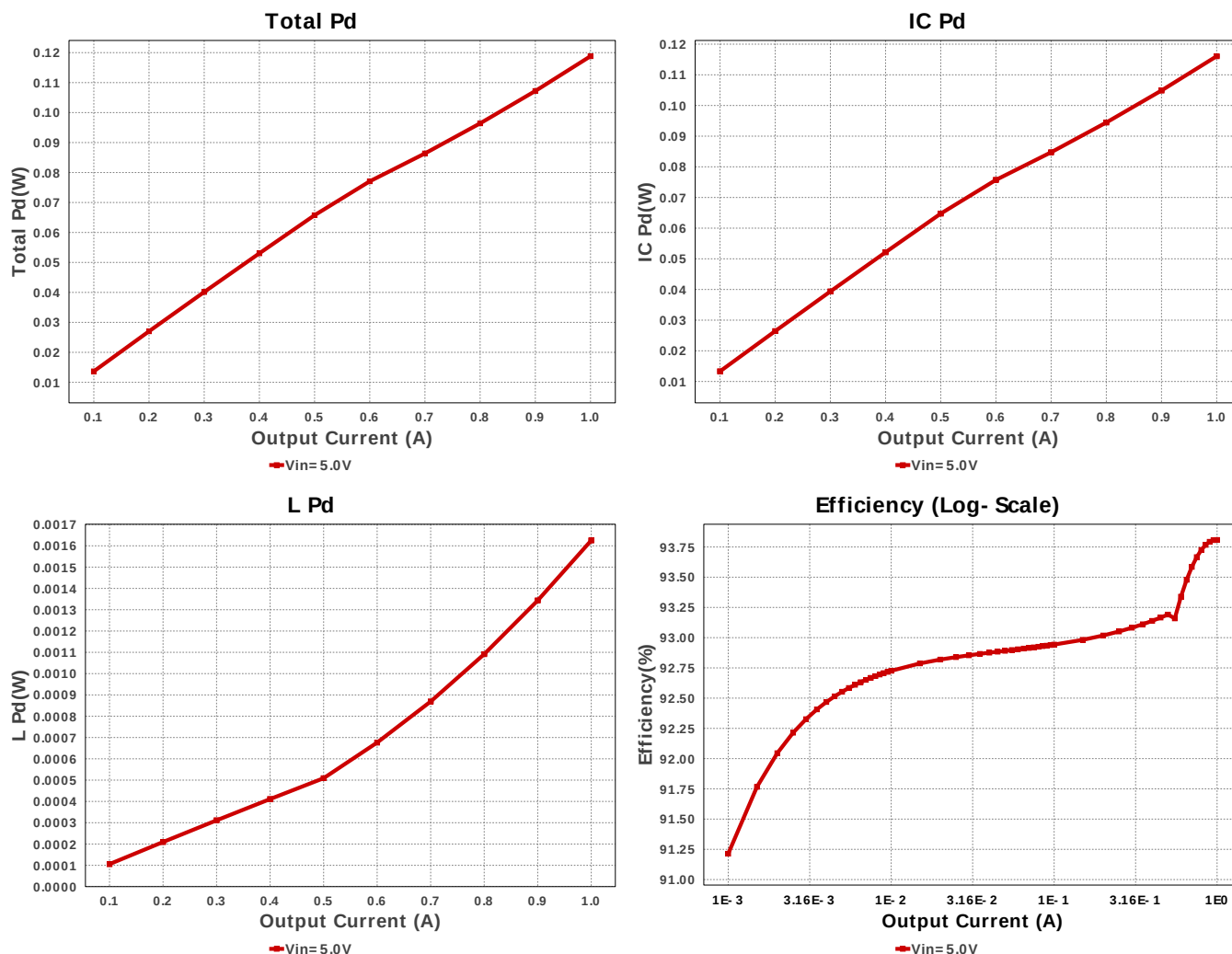


Electrical BOM

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cff	MuRata	GRM1555C1H121JA01D Series= C0G/NP0	Cap= 120.0 pF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
Cin	TDK	C5750X5R1E226M230KA Series= X5R	Cap= 22.0 uF ESR= 3.05 mOhm VDC= 25.0 V IRMS= 5.2277 A	1	\$0.92	2220_250 54 mm ²
Cout	MuRata	GRM32ER61C476KE15L Series= X5R	Cap= 47.0 uF ESR= 3.037 mOhm VDC= 16.0 V IRMS= 4.59346 A	1	\$0.38	1210_280 15 mm ²
L1	Würth Elektronik	744314047	L= 470.0 nH 1.485 mOhm	1	\$2.55	WE-HCI_7050 80 mm ²
Rfbb	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
Rfbb	Vishay-Dale	CRCW0402200KFKED Series= CRCW..e3	Res= 200.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
Rpg	Susumu Co Ltd	RR1220P-104-D Series= RR12	Res= 100.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	\$0.01	0805 7 mm ²
U1	Texas Instruments	TPS62822DLCR	Switcher	1	\$0.52	DLC0008A 8 mm ²







Operating Values

#	Name	Value	Category	Description
1.	BOM Count	8		Total Design BOM count
2.	Total BOM	\$4.41		Total BOM Cost
3.	Cin IRMS	516.562 mA	Capacitor	Input capacitor RMS ripple current
4.	Cin Pd	813.85 μ W	Capacitor	Input capacitor power dissipation
5.	Cout IRMS	307.368 mA	Capacitor	Output capacitor RMS ripple current
6.	Cout Pd	286.92 μ W	Capacitor	Output capacitor power dissipation
7.	IC Ipk	1.532 A	IC	Peak switch current in IC
8.	IC Pd	116.07 mW	IC	IC power dissipation
9.	IC Tj	38.113 degC	IC	IC junction temperature
10.	ICThetaJA Effective	69.9 degC/W	IC	Effective IC Junction-to-Ambient Thermal Resistance
11.	Iin Avg	383.76 mA	IC	Average input current
12.	L Ipp	1.065 A	Inductor	Peak-to-peak inductor ripple current
13.	L Pd	1.625 mW	Inductor	Inductor power dissipation
14.	Cin Pd	813.85 μ W	Power	Input capacitor power dissipation
15.	Cout Pd	286.92 μ W	Power	Output capacitor power dissipation
16.	IC Pd	116.07 mW	Power	IC power dissipation
17.	L Pd	1.625 mW	Power	Inductor power dissipation
18.	Total Pd	118.812 mW	Power	Total Power Dissipation
19.	Duty Cycle	36.659 %	System	Duty cycle
20.	Efficiency	93.808 %	System	Steady state efficiency
21.	FootPrint	172.0 mm ²	System	Total Foot Print Area of BOM components
22.	Frequency	2.212 MHz	System	Switching frequency
23.	Iout	1.0 A	System	Iout operating point
24.	Mode	CCM	System	Conduction Mode
25.	Pout	1.8 W	System	Total output power

#	Name	Value	Category	Description
26.	Vin	5.0 V	System Information	Vin operating point
27.	Vout	1.8 V	System Information	Operational Output Voltage
28.	Vout Actual	1.8 V	System Information	Vout Actual calculated based on selected voltage divider resistors
29.	Vout Tolerance	2.36 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
30.	Vout p-p	3.236 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	1.0	Maximum Output Current
VinMax	5.0	Maximum input voltage
VinMin	5.0	Minimum input voltage
Vout	1.8	Output Voltage
base_pn	TPS62822	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

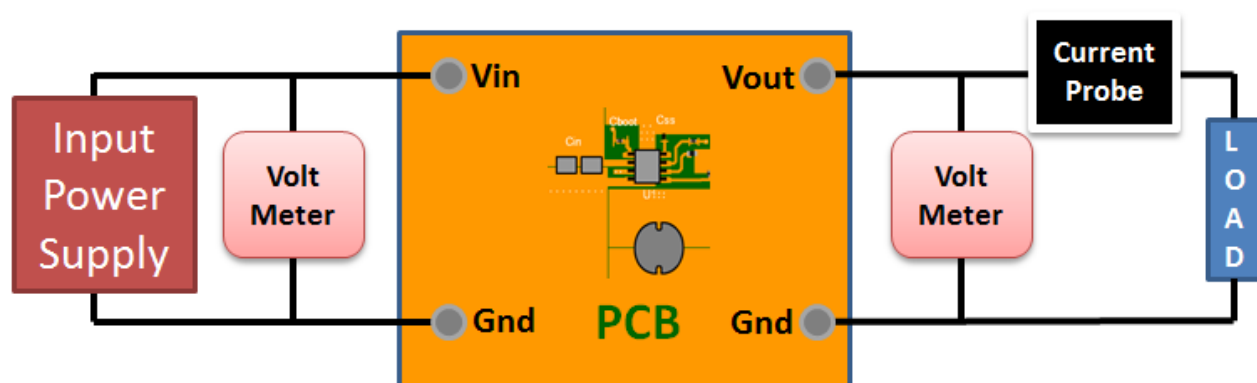
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. 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.

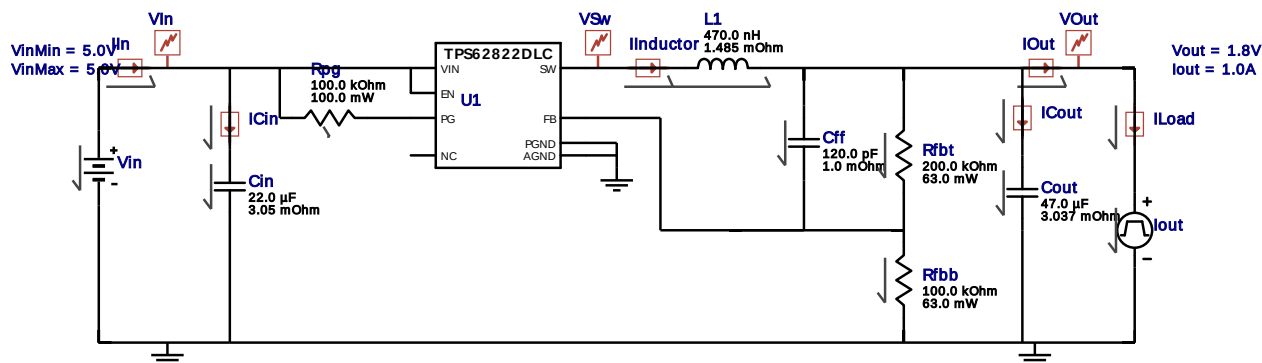


WEBENCH® Electrical Simulation Report

Design Id = 12

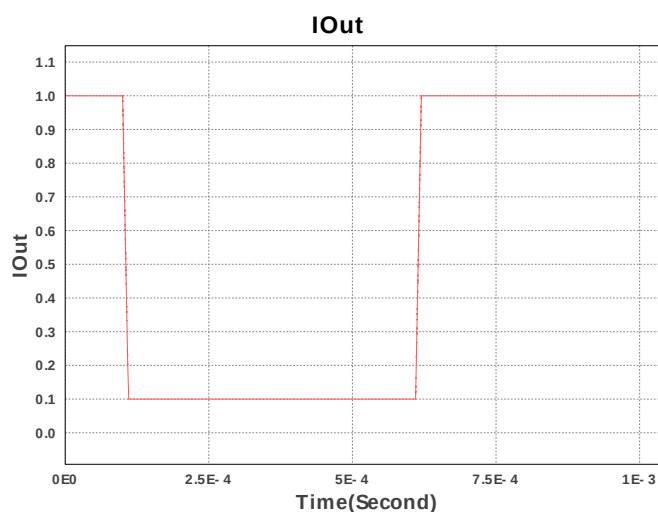
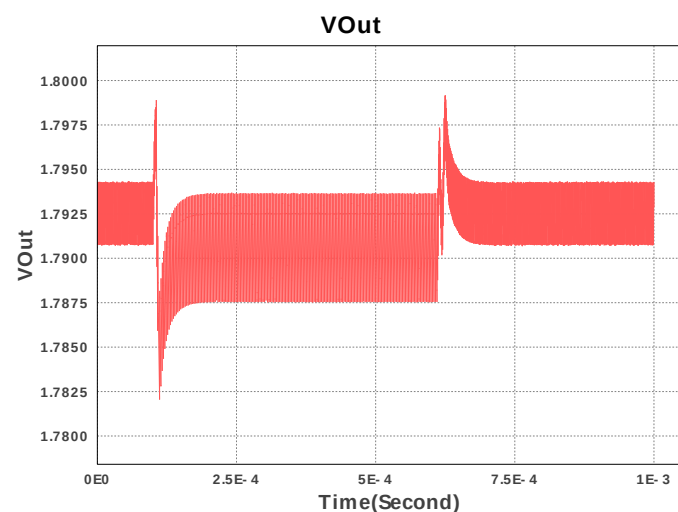
sim_id = 2

Simulation Type = Load Transient



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	L1	IC	Initial Current	1.0 A
2.	Cout	IC	Initial Voltage	1.8 V
3.	IOut	signal_type	Signal Type	PULSE
		I1	Initial Load Current	0 A
		I2	Minimum Load Current	1 A
		Td	Initial Time Delay	200u s
		Tf	Fall Time	1u s
		Tr	Rise Time	1u s
		Pw	Pulse Width	100u s
4.	Iload	I	Load Current	Iload1 A
5.	Iout	signal_type	Signal Type	PULSE
		I1	Initial Load Current	1.0 A
		I2	Minimum Load Current	0.1 A
		Td	Initial Time Delay	0.1m s
		Tf	Fall Time	10u s
		Tr	Rise Time	10u s
		Pw	Pulse Width	0.5m s



Design Assistance

1. Master key : 056C8D7E341690A0[v1]

2. **TPS62822** Product Folder : <http://www.ti.com/product/TPS62822> : contains the data sheet and other resources.

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