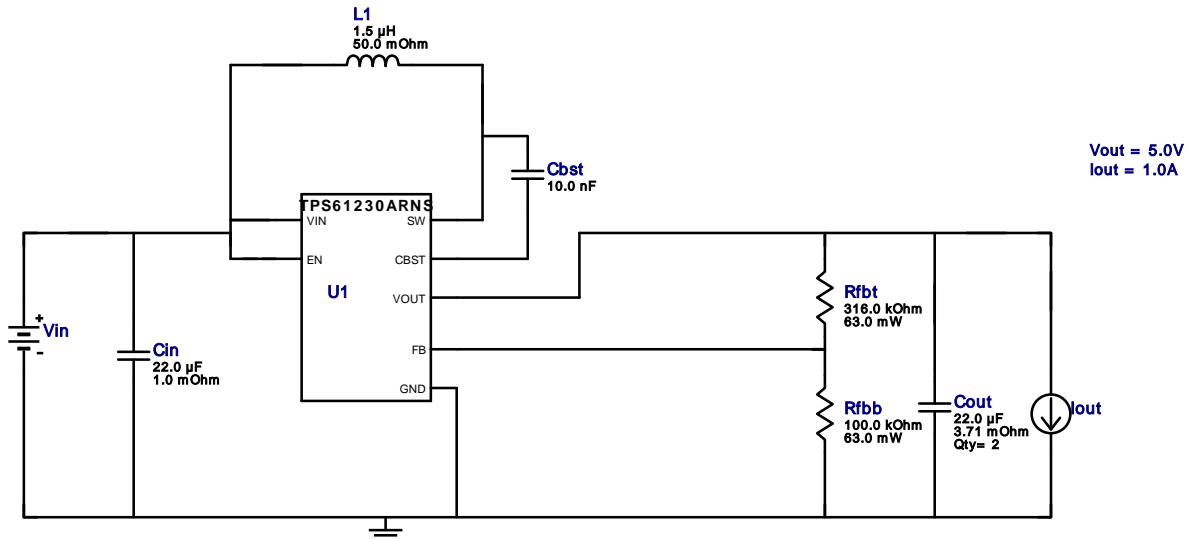


VinMin = 3.5V  
VinMax = 4.2V  
Vout = 5.0V  
Iout = 1.0A

Device = TPS61230ARNSR  
Topology = Boost  
Created = 2022-02-06 02:40:25.972  
BOM Cost = \$1.08  
BOM Count = 1  
Total Pd = 0.37W

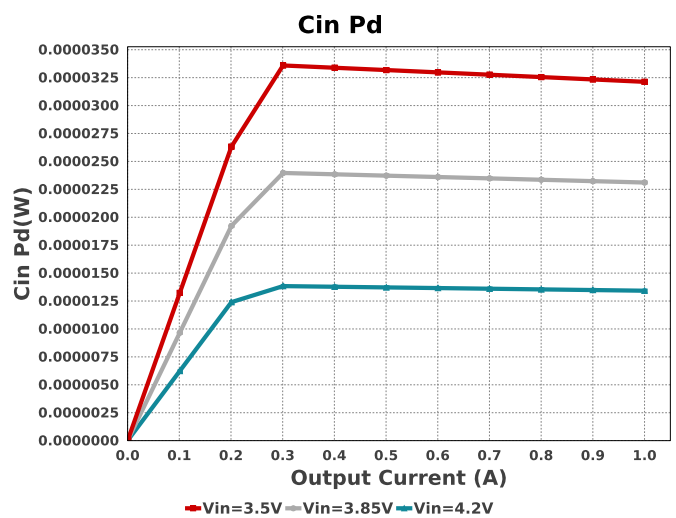
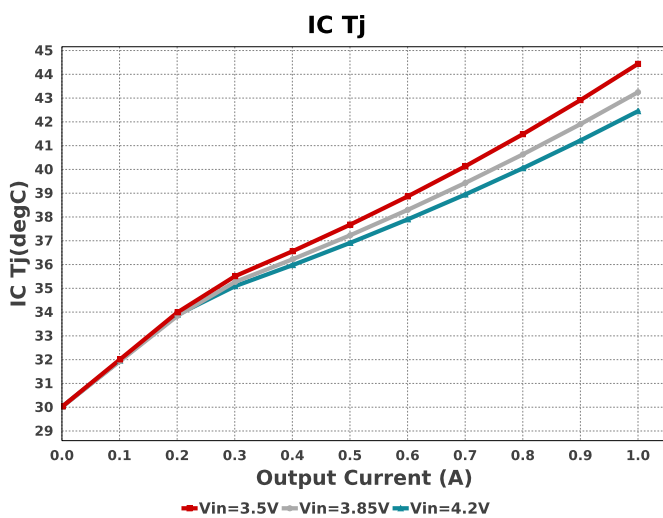
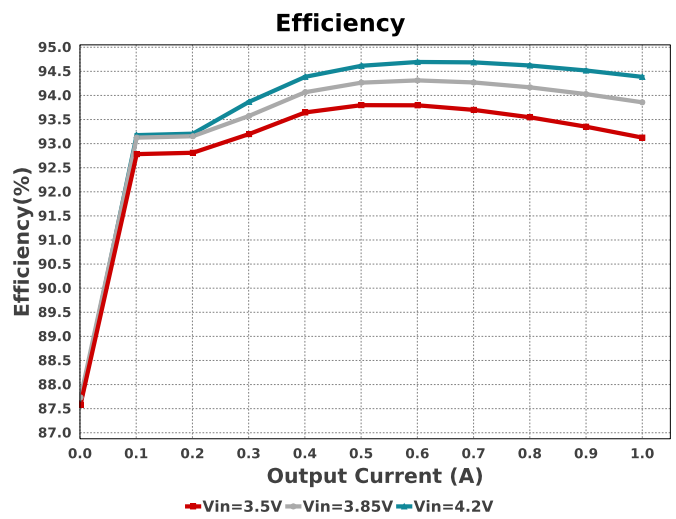
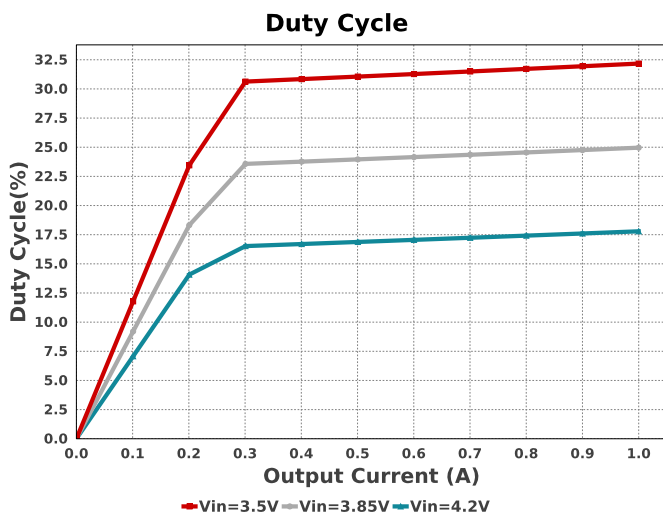
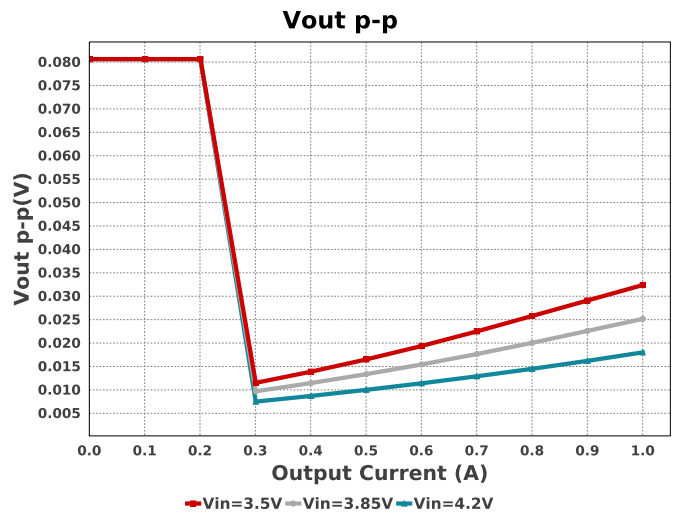
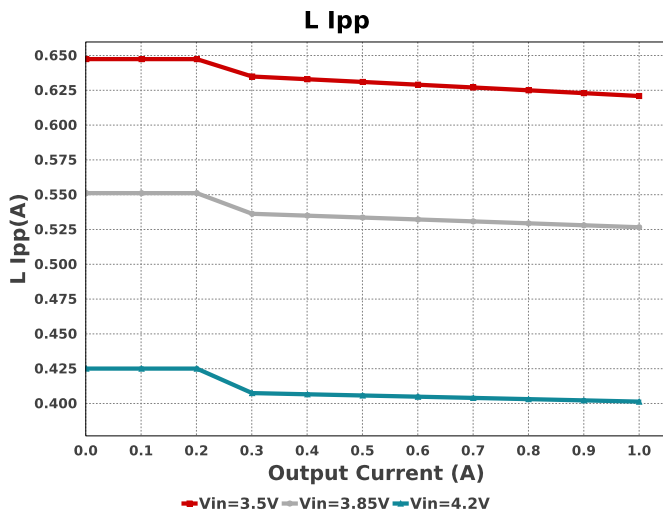
## WEBENCH® Design Report

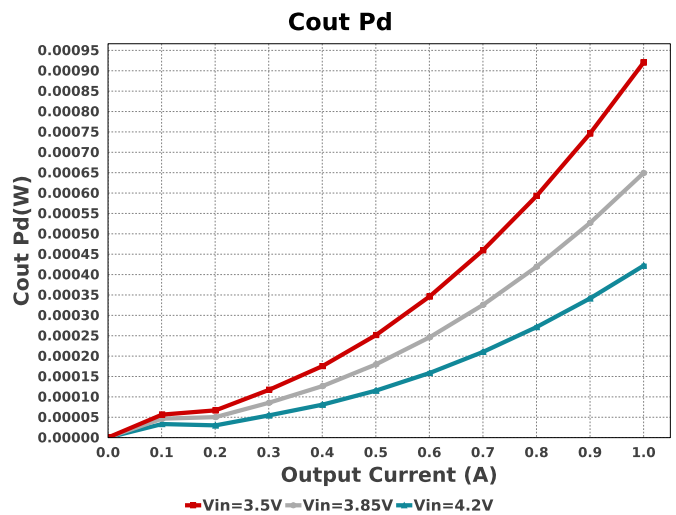
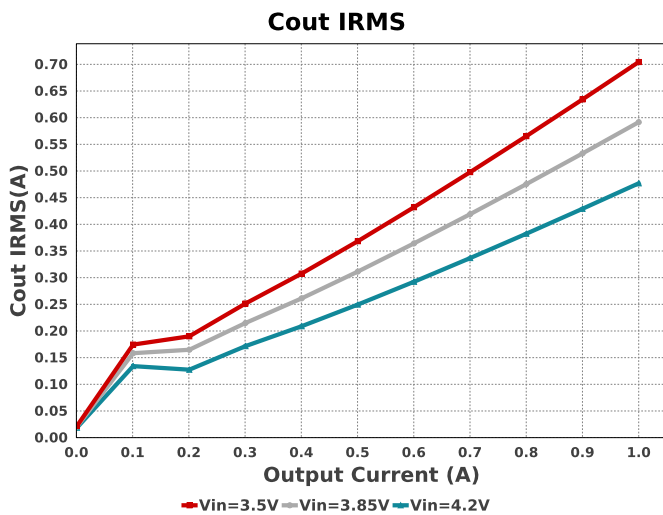
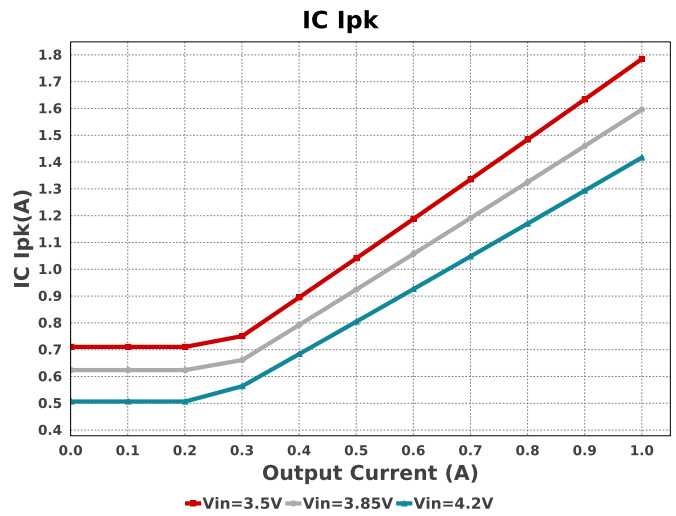
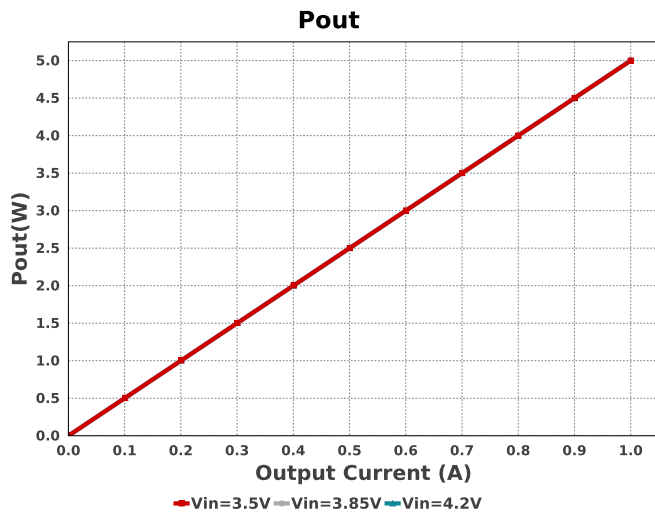
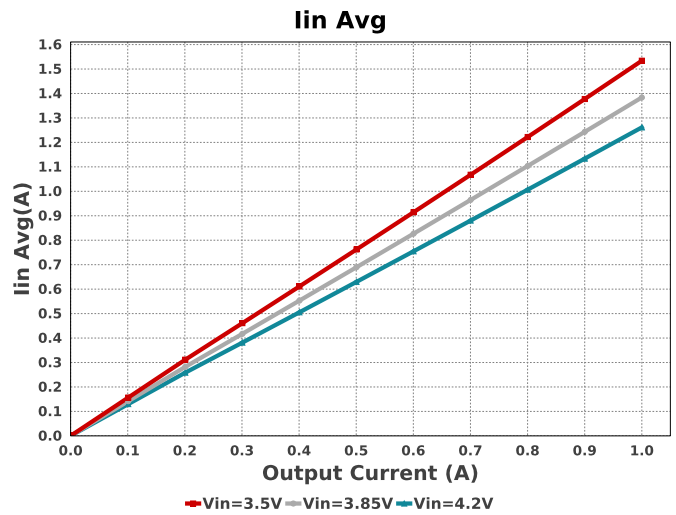
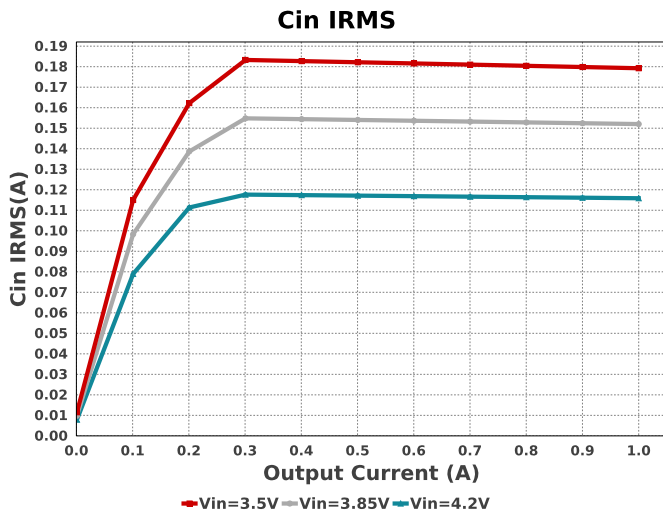
Design : 8 TPS61230ARNSR  
TPS61230ARNSR 3.5V-4.2V to 5.00V @ 1A

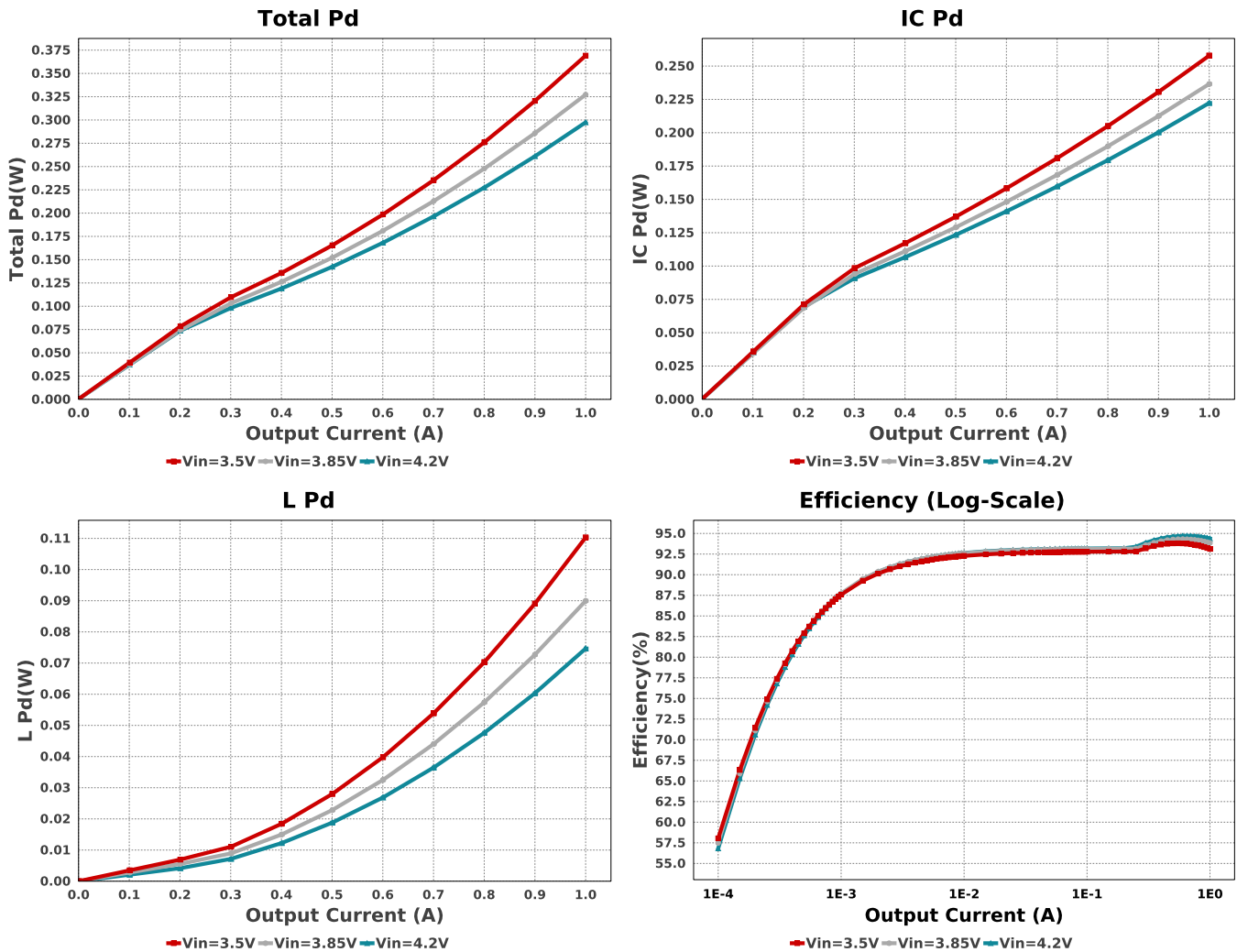


### Electrical BOM

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cbst	TDK	CGA4C2C0G1H103J060AA Series= C0G/NP0	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.06	0805 7 mm <sup>2</sup>
Cin	MuRata	GRM188R60J226MEA0D Series= X5R	Cap= 22.0 uF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 6.0 A	1	\$0.05	0603 5 mm <sup>2</sup>
Cout	TDK	C1608X5R1A226M080AC Series= X5R	Cap= 22.0 uF ESR= 3.71 mOhm VDC= 10.0 V IRMS= 2.69936 A	2	\$0.12	0603 5 mm <sup>2</sup>
L1	CUSTOM	CUSTOM	L= 1.5 µH 50.0 mOhm	1	\$0.05	VLP8040 9 mm <sup>2</sup>
Rfbb	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
Rfbb	Vishay-Dale	CRCW0402316KFKED Series= CRCW..e3	Res= 316.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
U1	Texas Instruments	TPS61230ARNSR	Switcher	1	\$0.66	RNS0007A 9 mm <sup>2</sup>







## Operating Values

#	Name	Value	Category	Description
1.	Total BOM	\$1.078		Total BOM Cost
2.	Cin IRMS	179.237 mA	Capacitor	Input capacitor RMS ripple current
3.	Cin Pd	32.126 $\mu$ W	Capacitor	Input capacitor power dissipation
4.	Cout IRMS	704.357 mA	Capacitor	Output capacitor RMS ripple current
5.	Cout Pd	920.3 $\mu$ W	Capacitor	Output capacitor power dissipation
6.	IC Ipk	1.785 A	IC	Peak switch current in IC
7.	IC Pd	257.84 mW	IC	IC power dissipation
8.	IC Tj	44.439 degC	IC	IC junction temperature
9.	ICThetaJA	56.0 degC/W	IC	IC junction-to-ambient thermal resistance
10.	Iin Avg	1.534 A	IC	Average input current
11.	L Ipp	620.895 mA	Inductor	Peak-to-peak inductor ripple current
12.	L Pd	110.29 mW	Inductor	Inductor power dissipation
13.	Cin Pd	32.126 $\mu$ W	Power	Input capacitor power dissipation
14.	Cout Pd	920.3 $\mu$ W	Power	Output capacitor power dissipation
15.	IC Pd	257.84 mW	Power	IC power dissipation
16.	L Pd	110.29 mW	Power	Inductor power dissipation
17.	Total Pd	369.119 mW	Power	Total Power Dissipation
18.	BOM Count	1	System	Total Design BOM count
19.	Duty Cycle	32.173 %	System	Duty cycle
20.	Efficiency	93.125 %	System	Steady state efficiency
21.	FootPrint	149.0 mm <sup>2</sup>	System	Total Foot Print Area of BOM components
22.	Frequency	1.172 MHz	System	Switching frequency
23.	Iout	1.0 A	System	Iout operating point
24.	Mode	BOOST PWM CCM	System	PWM/PFM Mode

#	Name	Value	Category	Description
25.	Pout	5.0 W	System Information	Total output power
26.	Vin	3.5 V	System Information	Vin operating point
27.	Vout Actual	4.971 V	System Information	Vout Actual calculated based on selected voltage divider resistors
28.	Vout Tolerance	1.255 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
29.	Vout p-p	32.389 mV	System Information	Peak-to-peak output ripple voltage

## Design Inputs

Name	Value	Description
Iout	1.0	Maximum Output Current
VinMax	4.2	Maximum input voltage
VinMin	3.5	Minimum input voltage
Vout	5.0	Output Voltage
base_pn	TPS61230A	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 town 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 3.5V 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 lout 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.

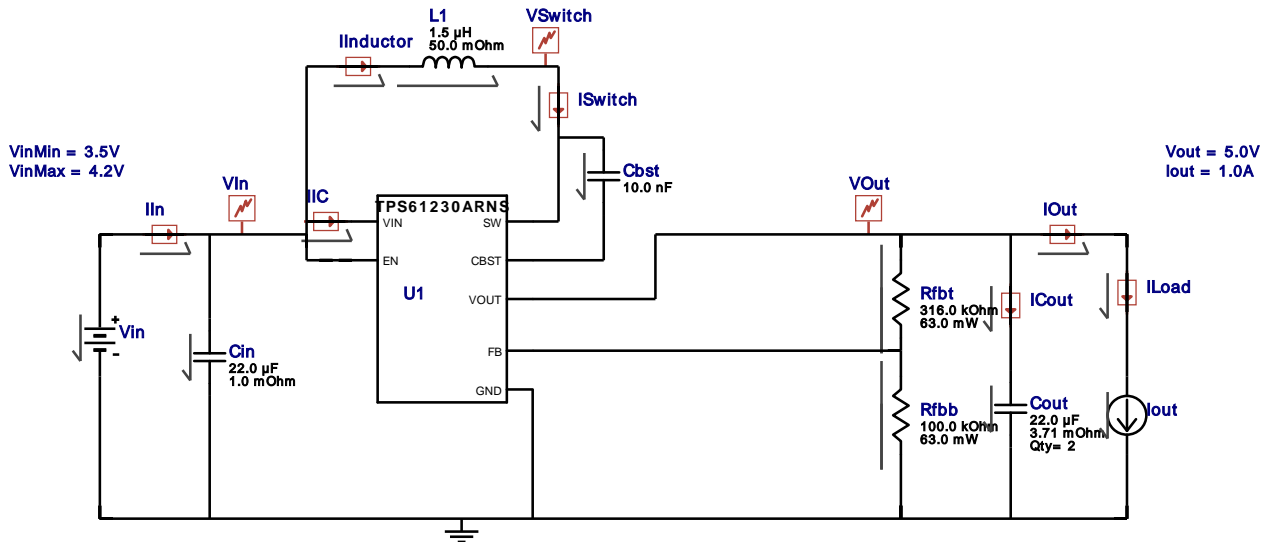


# WEBENCH® Electrical Simulation Report

Design Id = 8

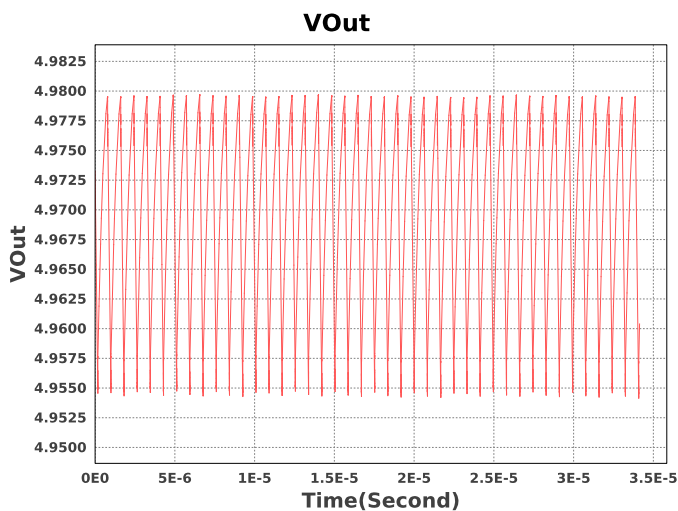
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Simulation Type = Steady State



## Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	L1	IC	Initial condition	-1.0 A
2.	Cin	IC	Initial Condition	3
3.	Cout	IC	no description	5.0 V
4.	Iout	I	Load Current	1.0 A



## Design Assistance

- Master key : 80A8A632ED49114A[v1]
- TPS61230A** Product Folder : <http://www.ti.com/product/TPS61230A> : contains the data sheet and other resources.

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