





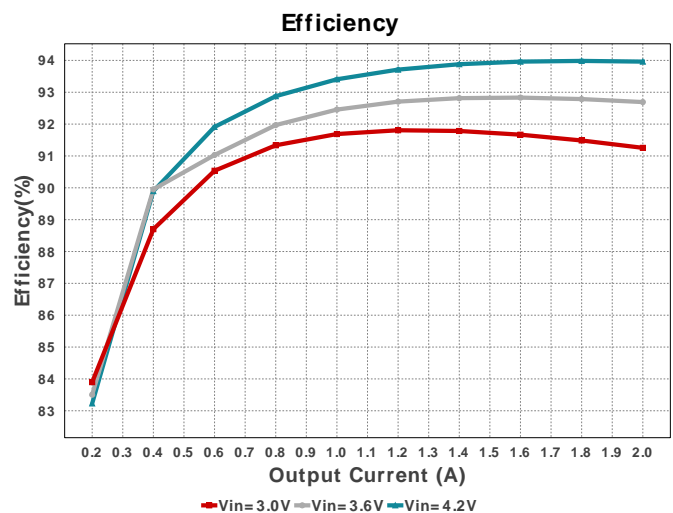
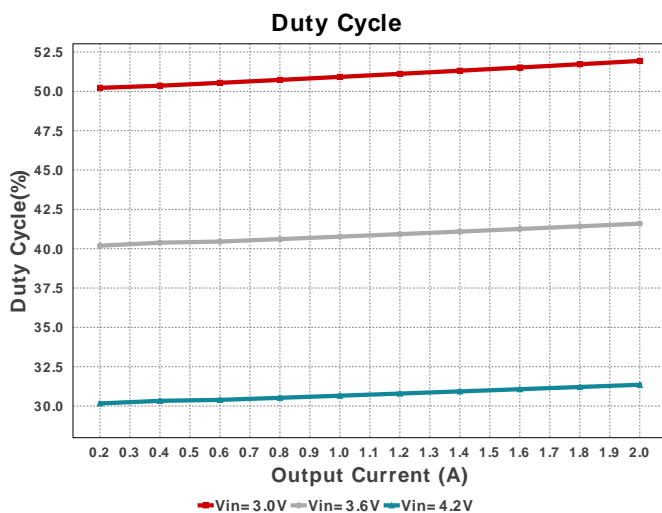
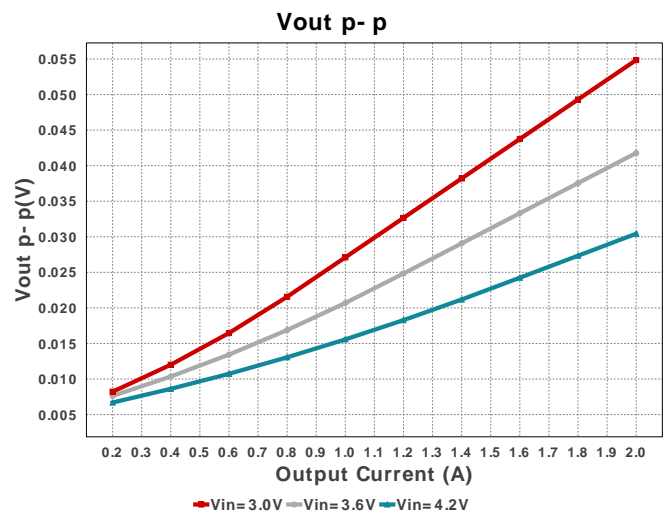
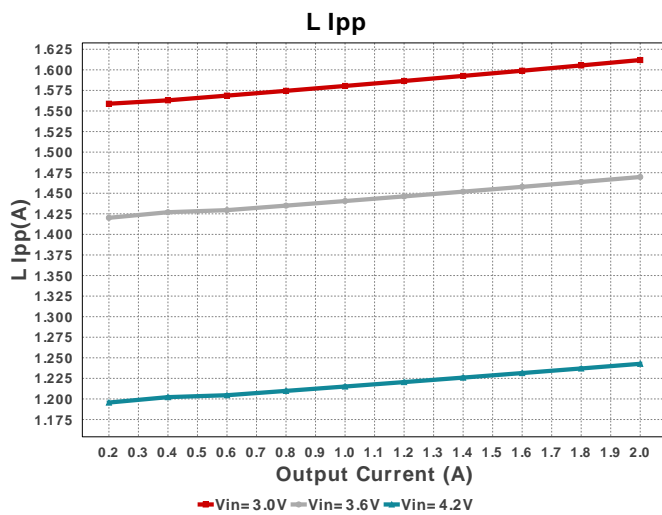
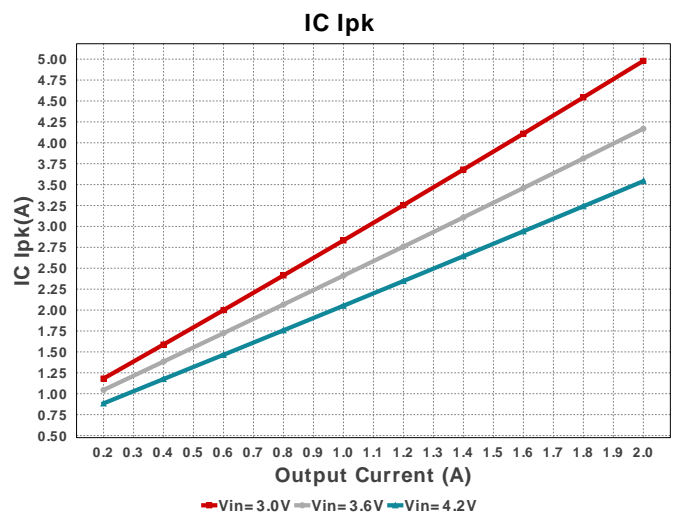
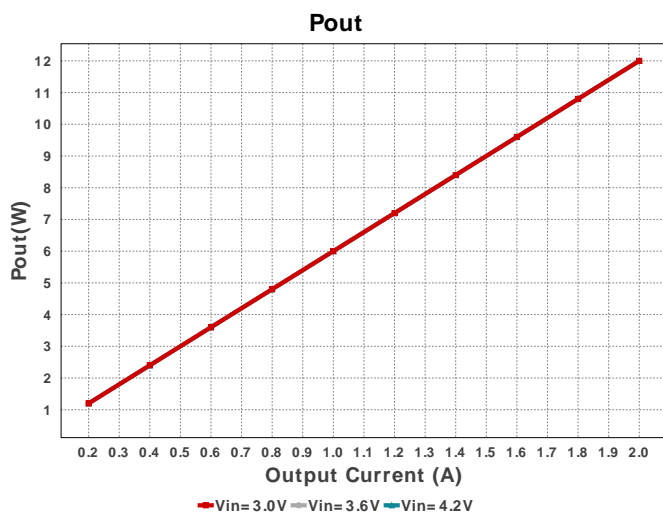
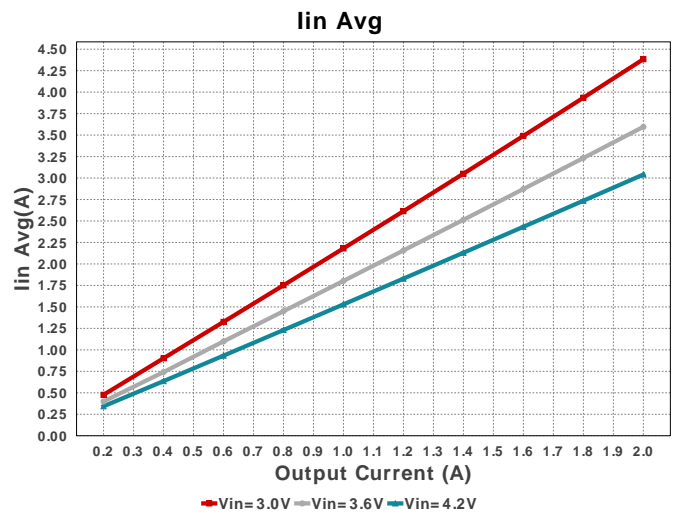
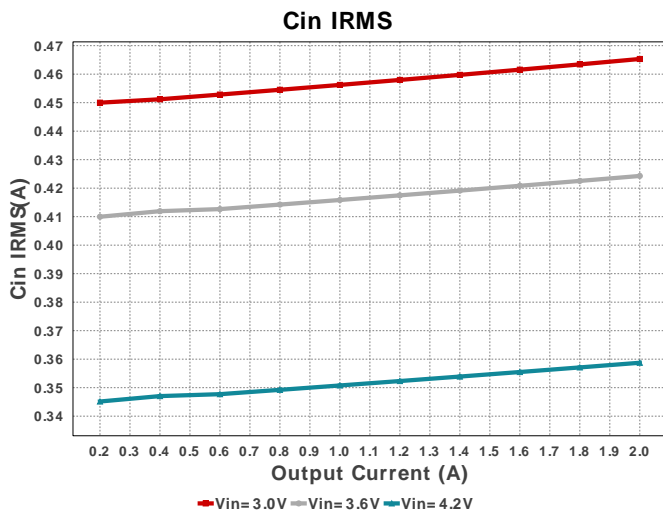
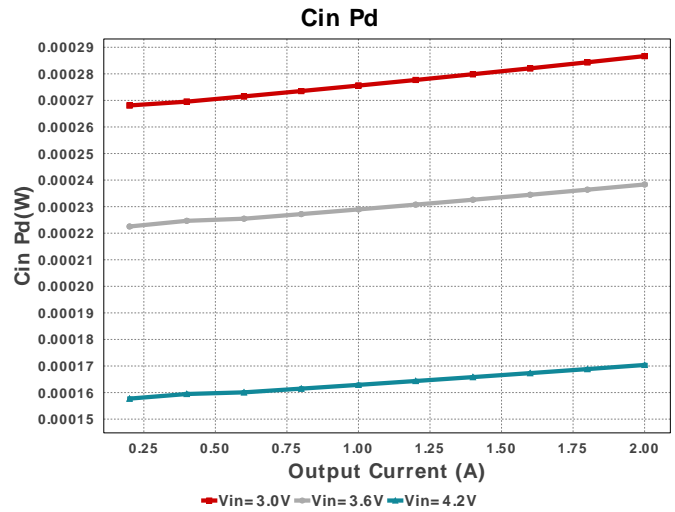
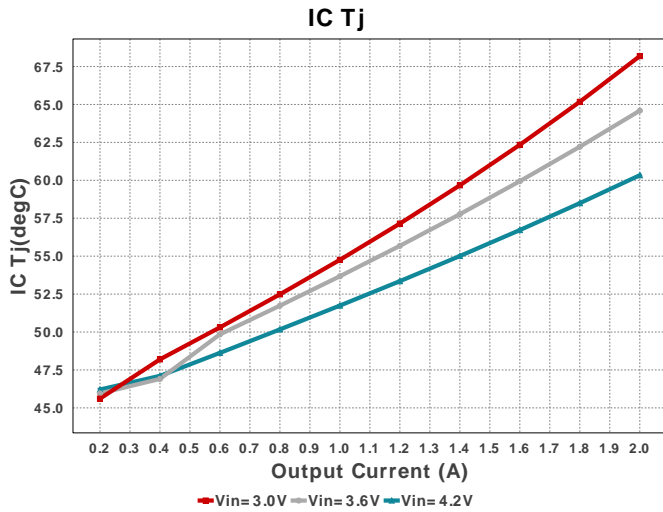


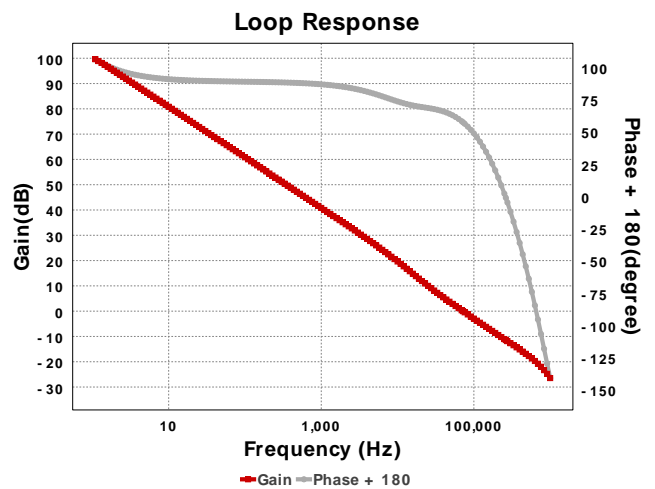
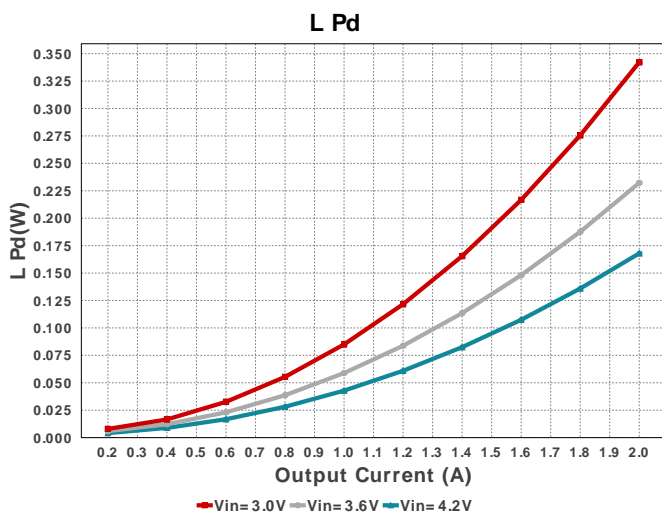
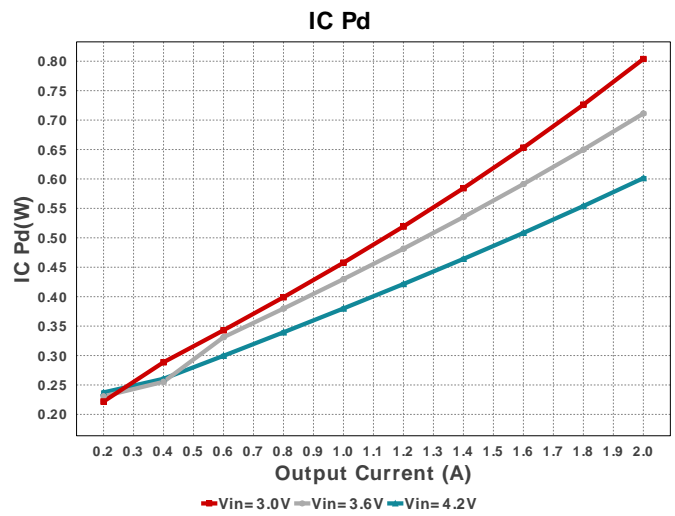
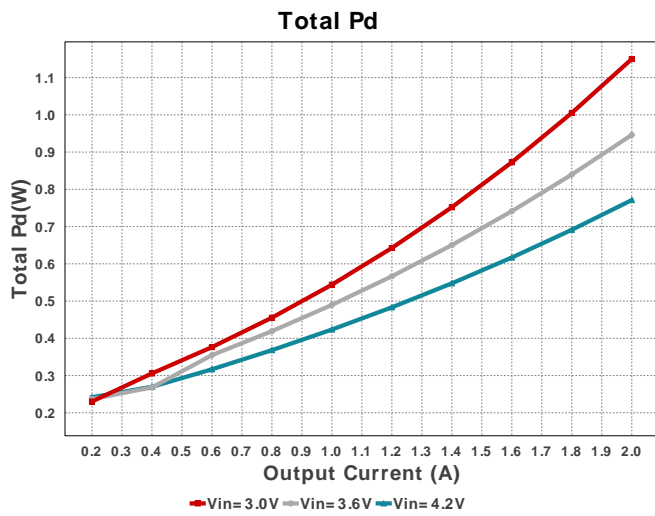
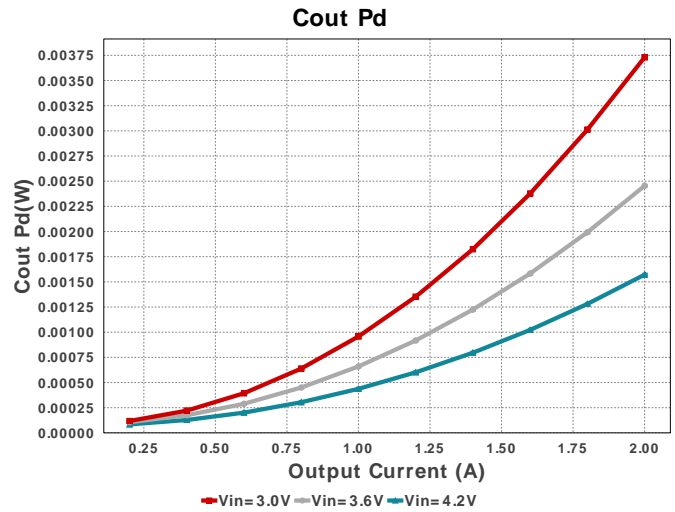
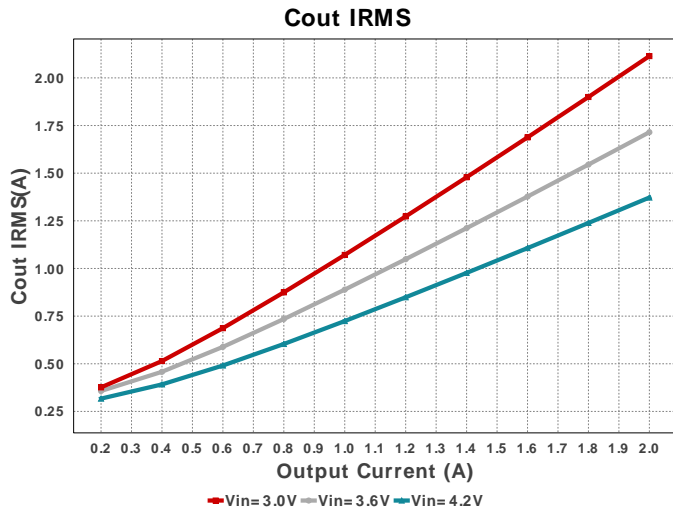


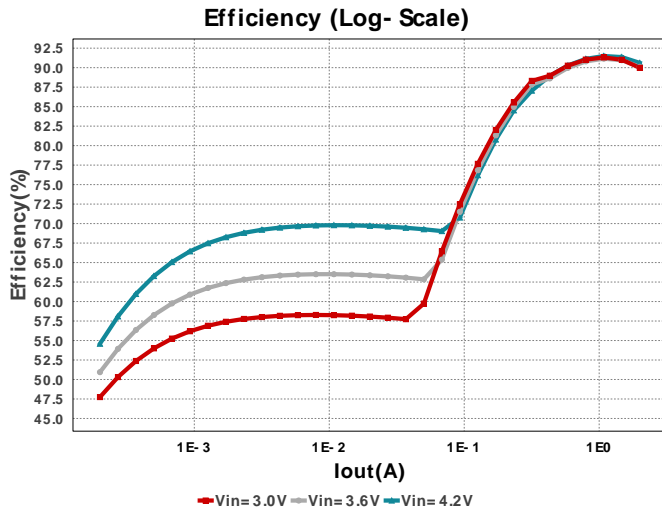
Device = TPS61088RHLR  
Topology = Boost  
Created = 2019-08-03 20:41:55.103  
BOM Cost = \$3.61  
BOM Count = 17  
Total Pd = 1.15W

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Rcomp	Vishay-Dale	CRCW080515K4FKEA Series= CRCW..e3	Res= 15.4 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
Rfbb	Vishay-Dale	CRCW0402118KFKED Series= CRCW..e3	Res= 118.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
Rfbt	Yageo	RC0603FR-07470KL Series= ?	Res= 470.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm <sup>2</sup>
Rlim	Vishay-Dale	CRCW0402187KFKED Series= CRCW..e3	Res= 187.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
Rt	Vishay-Dale	CRCW040269K8FKED Series= CRCW..e3	Res= 69.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
U1	Texas Instruments	TPS61088RHLLR	Switcher	1	\$1.60	 RHL0020A 25 mm <sup>2</sup>









## Operating Values

#	Name	Value	Category	Description
1.	BOM Count	17		Total Design BOM count
2.	Total BOM	\$3.61		Total BOM Cost
3.	Cin IRMS	465.324 mA	Capacitor	Input capacitor RMS ripple current
4.	Cin Pd	286.68 $\mu$ W	Capacitor	Input capacitor power dissipation
5.	Cout IRMS	2.114 A	Capacitor	Output capacitor RMS ripple current
6.	Cout Pd	3.73 mW	Capacitor	Output capacitor power dissipation
7.	IC Ipk	4.98 A	IC	Peak switch current in IC
8.	IC Pd	803.81 mW	IC	IC power dissipation
9.	IC Tj	68.188 degC	IC	IC junction temperature
10.	ICThetaJA	38.8 degC/W	IC	IC junction-to-ambient thermal resistance
11.	Iin Avg	4.383 A	IC	Average input current
12.	L Ipp	1.612 A	Inductor	Peak-to-peak inductor ripple current
13.	L Pd	342.12 mW	Inductor	Inductor power dissipation
14.	Cin Pd	286.68 $\mu$ W	Power	Input capacitor power dissipation
15.	Cout Pd	3.73 mW	Power	Output capacitor power dissipation
16.	IC Pd	803.81 mW	Power	IC power dissipation
17.	L Pd	342.12 mW	Power	Inductor power dissipation
18.	Total Pd	1.15 W	Power	Total Power Dissipation
19.	Cross Freq	71.656 kHz	System	Bode plot crossover frequency
			Information	
20.	Duty Cycle	51.936 %	System	Duty cycle
			Information	
21.	Efficiency	91.255 %	System	Steady state efficiency
			Information	
22.	FootPrint	122.0 mm <sup>2</sup>	System	Total Foot Print Area of BOM components
			Information	
23.	Frequency	1.726 MHz	System	Switching frequency
			Information	
24.	Gain Marg	-11.114 dB	System	Bode Plot Gain Margin
			Information	
25.	Iout	2.0 A	System	Iout operating point
			Information	
26.	Low Freq Gain	98.969 dB	System	Gain at 1Hz
			Information	
27.	Mode	BOOST CCM	System	PWM/PFM Mode
			Information	
28.	Phase Marg	58.55 deg	System	Bode Plot Phase Margin
			Information	
29.	Pout	12.0 W	System	Total output power
			Information	
30.	Vin	3.0 V	System	Vin operating point
			Information	
31.	Vout Actual	6.0 V	System	Vout Actual calculated based on selected voltage divider resistors
			Information	
32.	Vout Tolerance	4.273 %	System	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
			Information	
33.	Vout p-p	54.855 mV	System	Peak-to-peak output ripple voltage
			Information	

## Design Inputs

Name	Value	Description
Iout	2.0	Maximum Output Current
VinMax	4.2	Maximum input voltage
VinMin	3.0	Minimum input voltage
Vout	6.0	Output Voltage
base_pn	TPS61088	Base Product Number
source	DC	Input Source Type
Ta	37.0	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 3.0V 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. Master key : 84F8F281898B6F10[v1]
2. **TPS61088** Product Folder : <http://www.ti.com/product/TPS61088> : contains the data sheet and other resources.

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