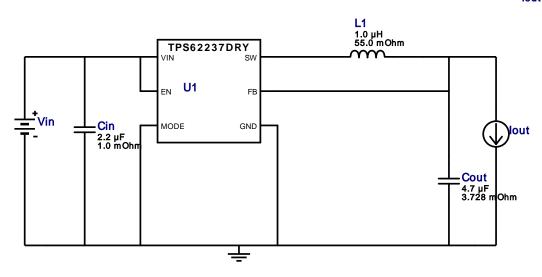
$\begin{aligned} & \text{VinMin} = 3.8 \text{V} \\ & \text{VinMax} = 5.5 \text{V} \\ & \text{Vout} = 3.3 \text{V} \\ & \text{lout} = 0.5 \text{A} \end{aligned}$

Device = TPS62237DRYR Topology = Buck Created = 2023-07-28 06:19:24.132 BOM Cost = \$0.61 BOM Count = 4 Total Pd = 0.31W

WEBENCH® Design Report

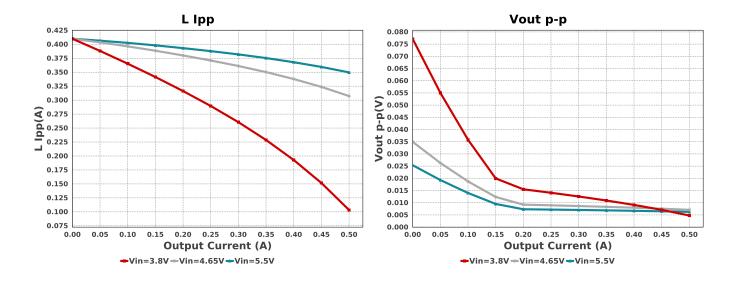
Design: 57 TPS62237DRYR TPS62237DRYR 3.8V-5.5V to 3.30V @ 0.5A

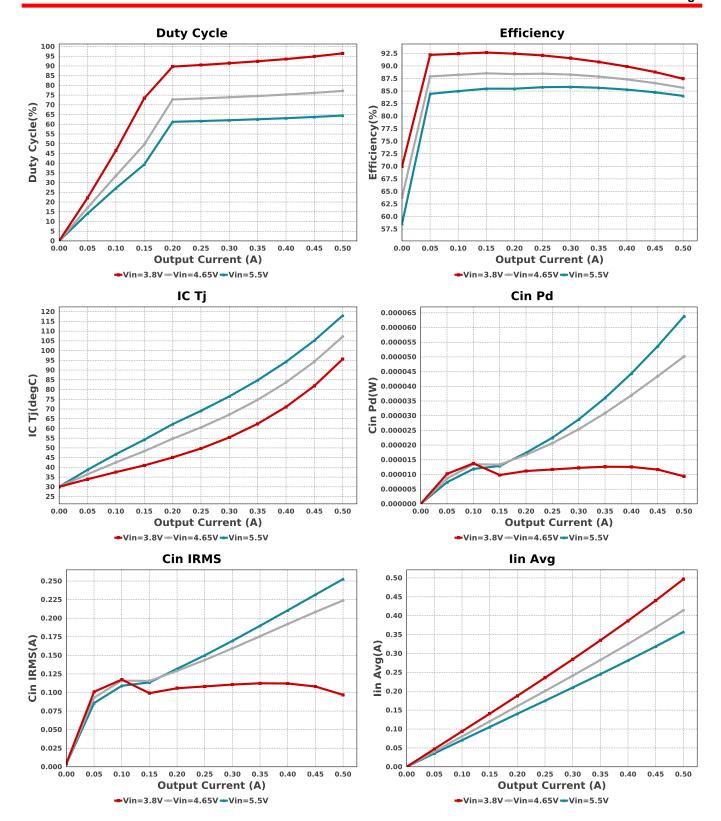
Vout = 3.3V lout = 0.5A



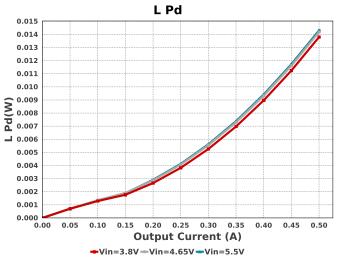
Electrical BOM

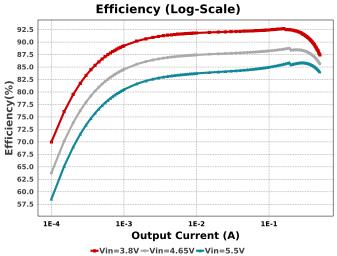
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cin	Kemet	C0603C225K8PACTU Series= X5R	Cap= 2.2 uF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.04	0603 5 mm ²
Cout	TDK	C1608X7S1A475K080AC Series= X7S	Cap= 4.7 uF ESR= 3.728 mOhm VDC= 10.0 V IRMS= 2.69359 A	1	\$0.05	0603 5 mm ²
L1	MuRata	LQM2HPN1R0MG0L	L= 1.0 μH 55.0 mOhm	1	\$0.09	1008 10 mm ²
U1	Texas Instruments	TPS62237DRYR	Switcher	1	\$0.43	DRY0006A 5 mm ²











Operating Values

Name	Value	Category	Description
-		•	Input capacitor RMS ripple current
	63.817 μW		Input capacitor power dissipation
	100.945 mA		Output capacitor RMS ripple current
Cout Pd	37.988 μW	Capacitor	Output capacitor power dissipation
IC Iq Pd	156.382 µW	IC	IC lq Pd
IC Pd	298.94 mW	IC	IC power dissipation
IC Tj	118.039 degC	IC	IC junction temperature
ICThetaJA	294.5 degC/W	IC	IC junction-to-ambient thermal resistance
lin Avg	356.98 mA	IC	Average input current
L lpp	349.68 mA	Inductor	Peak-to-peak inductor ripple current
L Pd	14.31 mW	Inductor	Inductor power dissipation
Cin Pd	63.817 µW	Power	Input capacitor power dissipation
Cout Pd	37.988 µW	Power	Output capacitor power dissipation
IC Pd	298.94 mW	Power	IC power dissipation
L Pd	14.31 mW	Power	Inductor power dissipation
Total Pd	313.377 mW	Power	Total Power Dissipation
BOM Count	4	System	Total Design BOM count
		,	···· ·· · · · · · · · · · · · · · · ·
Duty Cycle	64.499 %		Duty cycle
., ., .		Information	. 9 . 9
Efficiency	84.039 %	System	Steady state efficiency
,		•	,,
FootPrint	25.0 mm ²		Total Foot Print Area of BOM components
	20.0 111111	,	
Frequency	2.819 MHz		Switching frequency
		•	- · · · · · · · · · · · · · · · · · · ·
lout	500 0 mA		lout operating point
		•	Tout oponaming point
Mode	CCM		Conduction Mode
	••••	,	00.000000
Pout	1 65 W		Total output power
· out	1.00 11	,	rotal datpat portor
Total BOM	\$0.61		Total BOM Cost
Total BOW	ψ0.01	•	Total Bow Cool
Vin	55V		Vin operating point
VIII	0.0 V	•	viii operating point
Vout	3 3 V		Operational Output Voltage
Voul	0.0 v	,	Sporational Sulput Voltage
Vout Tolerance	530 3 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divide
vout rolerance	JJU.J III /0	,	resistors if applicable
Vout n.n.	6.256 m\/		Peak-to-peak output ripple voltage
νουι ρ-ρ	0.230 IIIV	System	r eak-to-peak output rippie voitage
	IC Pd IC Tj ICThetaJA Iin Avg L Ipp L Pd Cin Pd Cout Pd IC Pd L Pd	Cin Pd 63.817 μW Cout IRMS 100.945 mA Cout Pd 37.988 μW IC Iq Pd 156.382 μW IC Pd 298.94 mW IC Tj 118.039 degC ICThetaJA 294.5 degC/W lin Avg 356.98 mA L Ipp 349.68 mA L Pd 14.31 mW Cin Pd 63.817 μW Cout Pd 37.988 μW IC Pd 298.94 mW L Pd 14.31 mW Total Pd 313.377 mW BOM Count 4 Duty Cycle 64.499 % Efficiency 84.039 % FootPrint 25.0 mm² Frequency 2.819 MHz Iout 500.0 mA Mode CCM Pout 1.65 W Total BOM \$0.61 Vin 5.5 V Vout Tolerance 530.3 m%	Cin Pd 63.817 μW Capacitor Cout IRMS 100.945 mA Capacitor Cout Pd 37.988 μW Capacitor IC Iq Pd 156.382 μW IC IC Pd 298.94 mW IC IC Pd 298.94 mW IC IC Tj 118.039 degC IC ICThetaJA 294.5 degC/W IC Iin Avg 356.98 mA IC L Ipp 349.68 mA Inductor L Pd 14.31 mW Power Cout Pd 37.988 μW Power IC Pd 298.94 mW Power L Pd 14.31 mW Power Total Pd 313.377 mW Power Total Pd 313.377 mW Power BOM Count 4 System Information FootPrint 25.0 mm² System Information FootPrint 25.0 mm² System Information FootPrint 500.0 mA System Information System Inform

Design Inputs

Name	Value	Description	
lout	500.0 m	Maximum Output Current	
VinMax	5.5	Maximum input voltage	
VinMin	3.8	Minimum input voltage	
Vout	3.3	Output Voltage	
base_pn	TPS62237	Base Product Number	
source	DC	Input Source Type	

Name	Value	Description	
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 Cin and Cout, 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

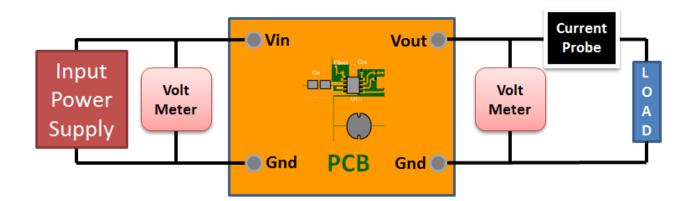
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. 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 3.8V and set the input supply's current limit to zero. With the input supply off connect up the input supply to Vin and GND. Connect a digital volt meter and a load if needed to set the minimum lout of the design from Vout 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 Vin and GND, a load is connected between Vout and GND and a current meter is connected in series between Vout 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.



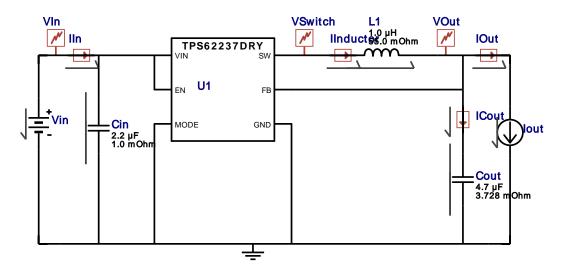
WEBENCH[®] Electrical Simulation Report

Design Id = 57

 $sim_id = 1$

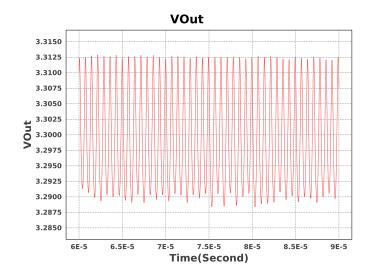
Simulation Type = Steady State

vinimin = 3.8 v VinMax = 5.5 V vout = 3.3v lout = 0.5A



Simulation Parameters

# Name	Parameter Name	Description	Values
1. lout	1	Load Current	0.5.4



Design Assistance

- 1. Master key: A4C221B9BFB078B3[v1]
- 2. TPS62237 Product Folder: http://www.ti.com/product/TPS62230: contains the data sheet and other resources.

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