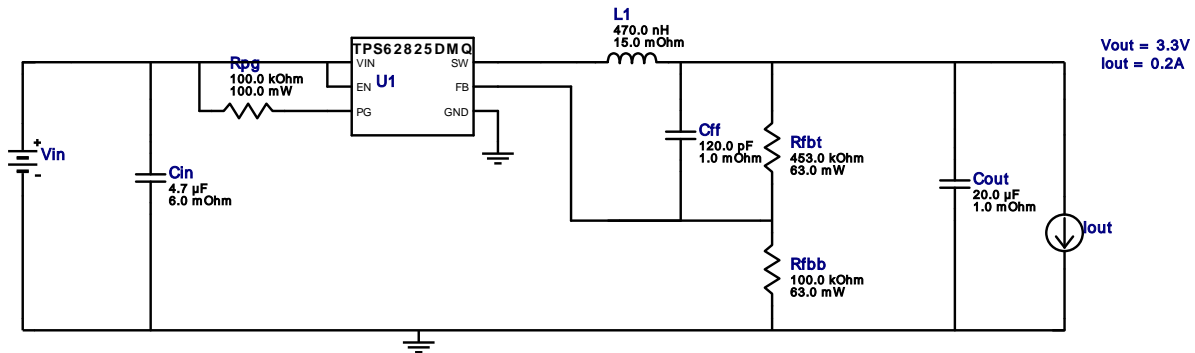


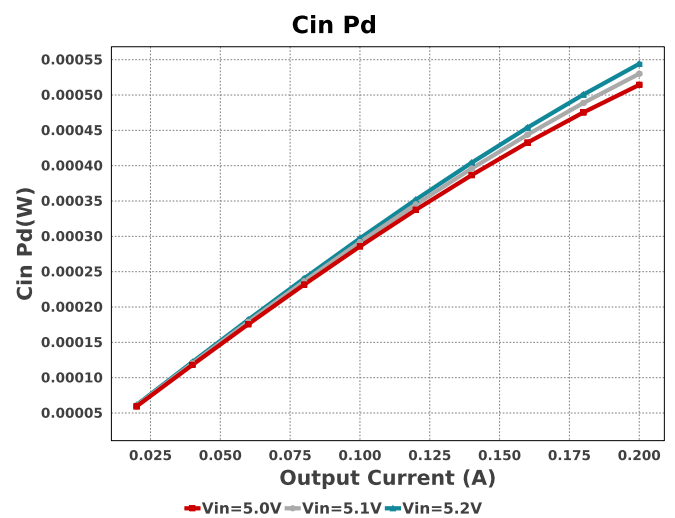
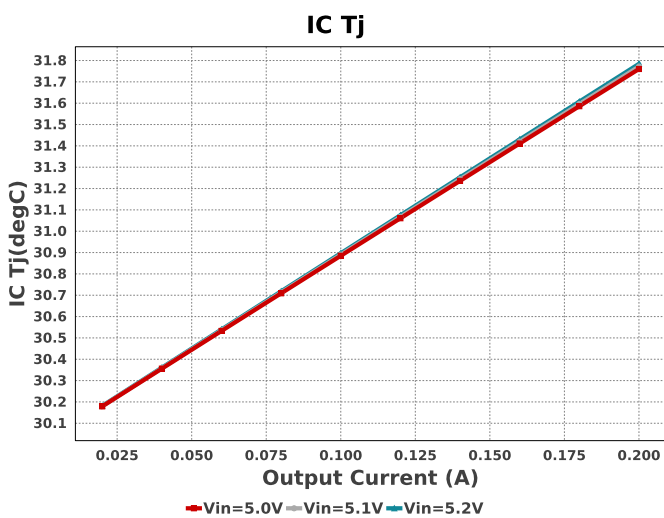
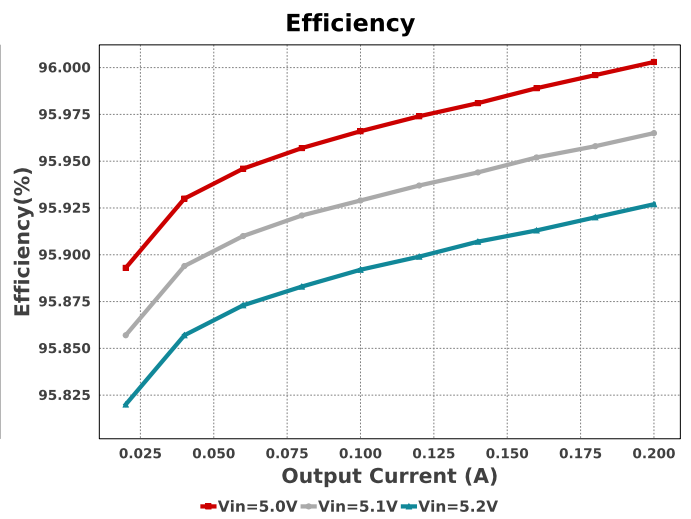
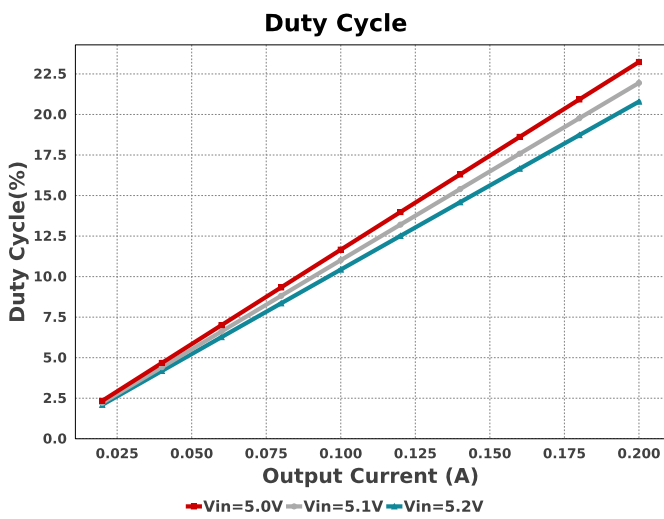
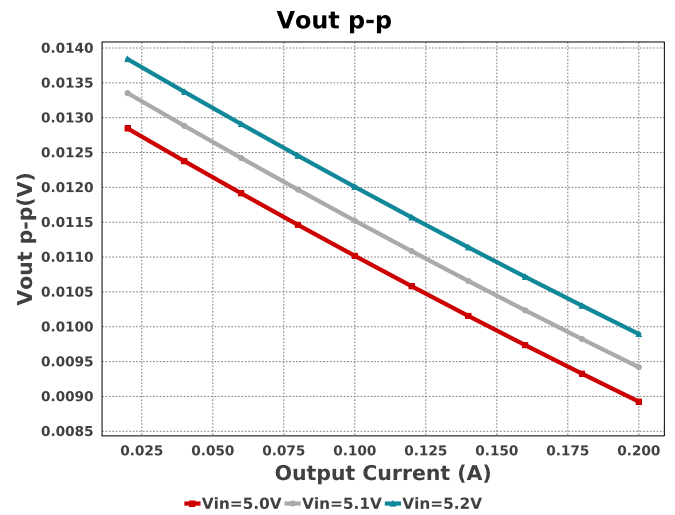
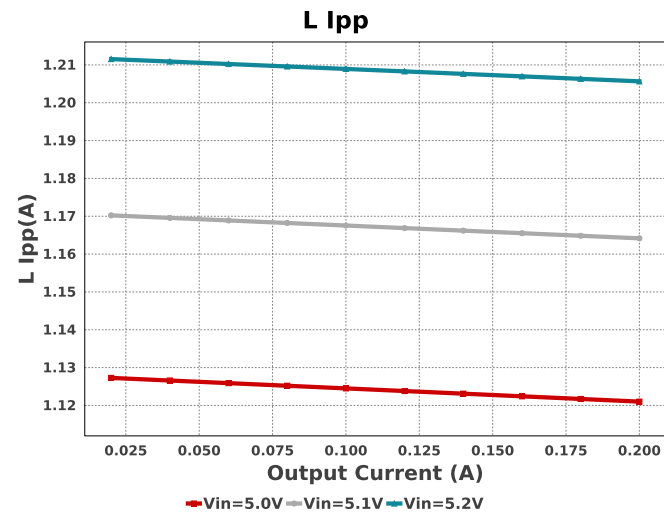
## WEBENCH® Design Report

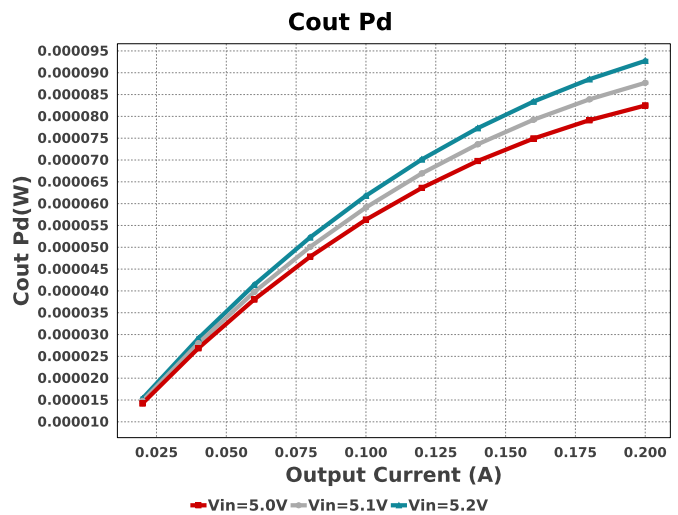
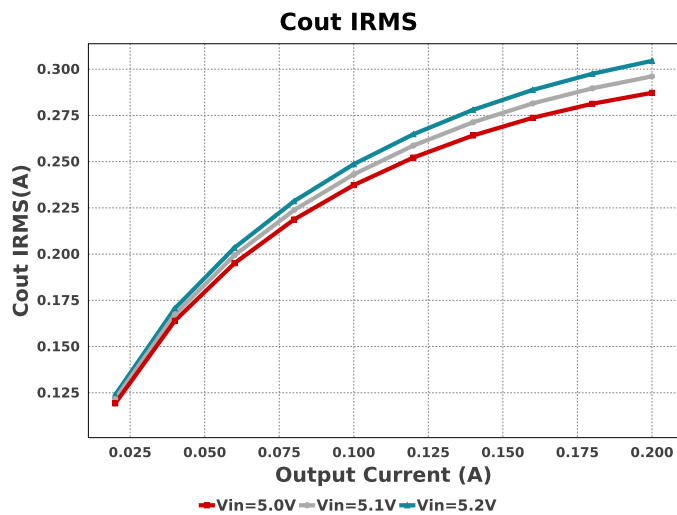
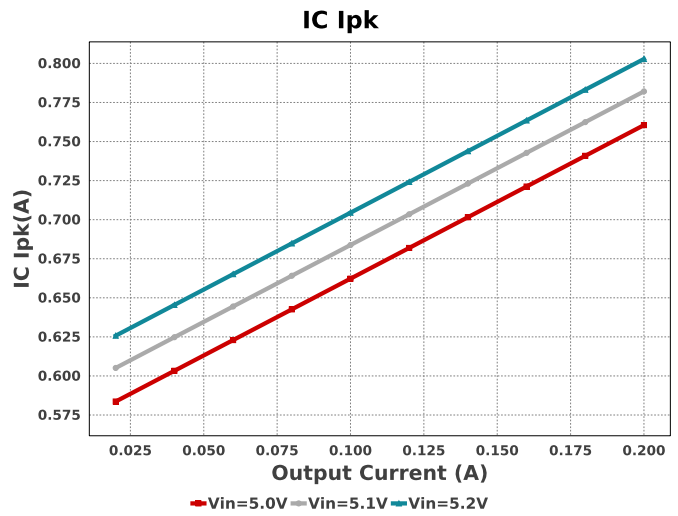
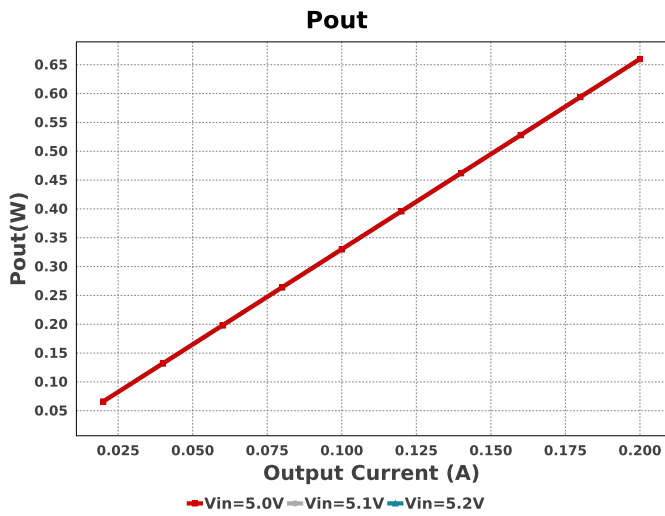
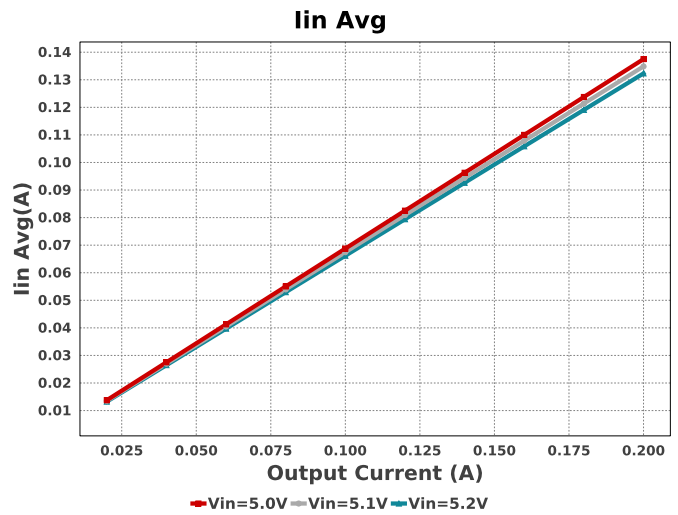
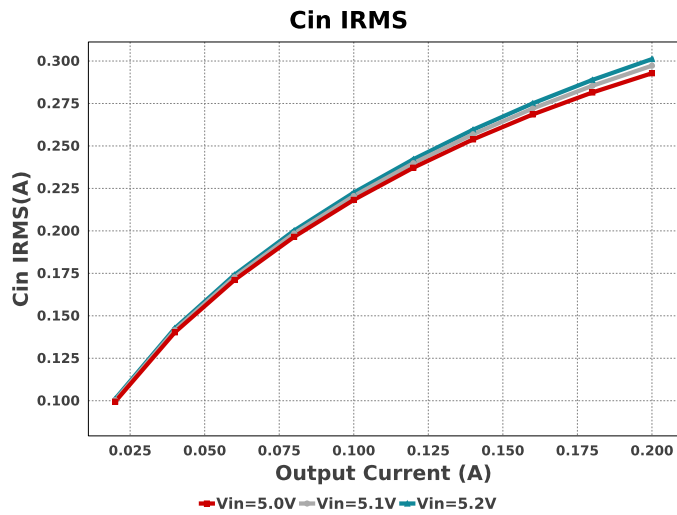
Design : 42 TPS62825DMQR  
TPS62825DMQR 5V-5.2V to 3.30V @ 0.2A

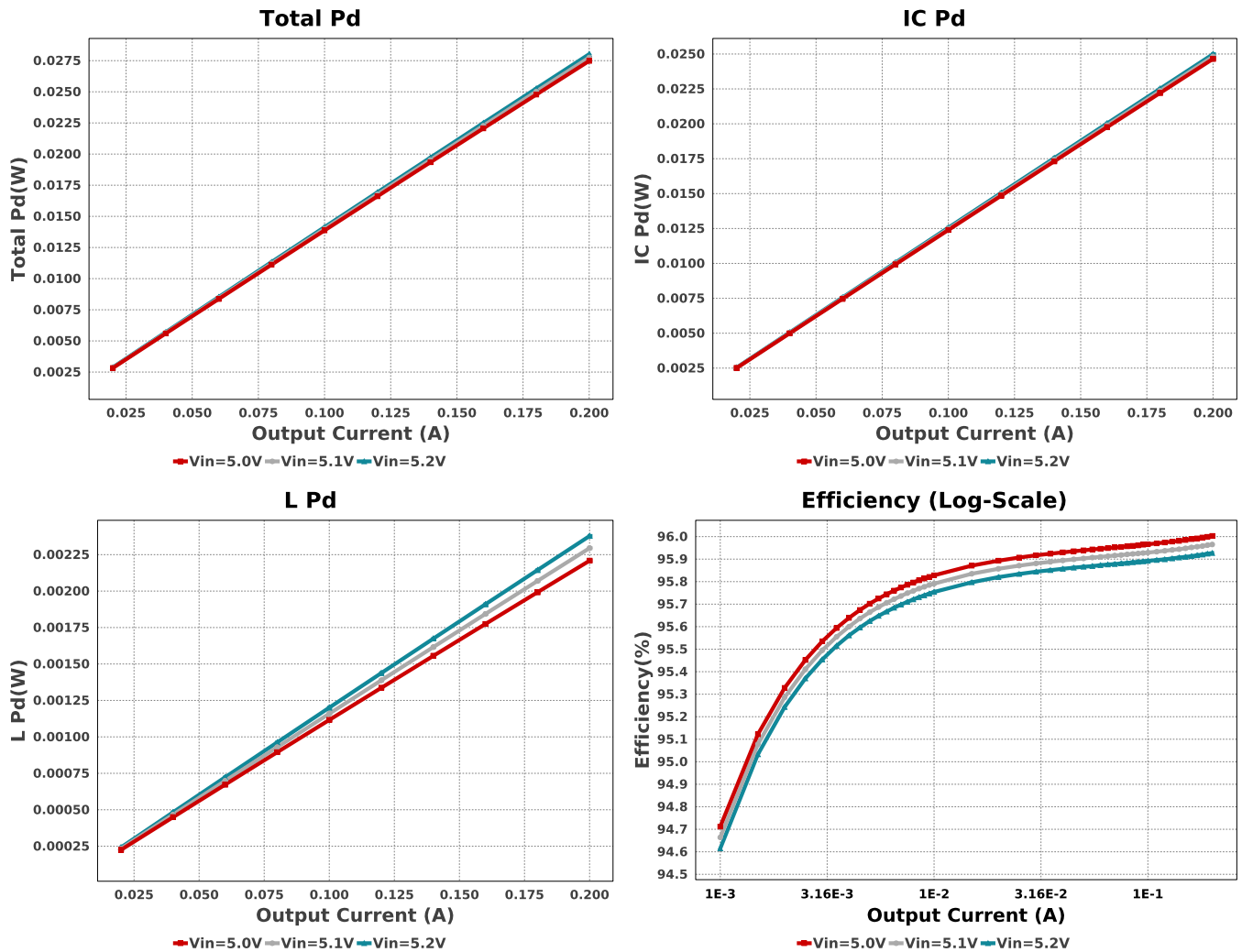


## Electrical BOM

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 <sup>2</sup>
Cin	Kemet	C0603C475K8PACTU Series= X5R	Cap= 4.7 uF ESR= 6.0 mOhm VDC= 10.0 V IRMS= 7.24 A	1	\$0.07	0603 5 mm <sup>2</sup>
Cout	CUSTOM	CUSTOM Series= ?	Cap= 20.0 uF ESR= 1.0 mOhm VDC= 3.63 V IRMS= 100.0 mA	1	NA	CUSTOM 0 mm <sup>2</sup>
L1	Vishay-Dale	IHLP1212AEERR47M11	L= 470.0 nH 15.0 mOhm	1	\$0.63	IHLP-1212AE 19 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	CRCW0402453KFKED Series= CRCW...e3	Res= 453.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
Rpg	Susumu Co Ltd	RR1220P-104-D Series= RR12	Res= 100.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	\$0.02	0805 7 mm <sup>2</sup>
U1	Texas Instruments	TPS62825DMQR	Switcher	1	\$0.35	DMQ0006A 6 mm <sup>2</sup>







## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	301.134 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	544.09 $\mu$ W	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	304.501 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	92.721 $\mu$ W	Capacitor	Output capacitor power dissipation
5.	IC Ipk	802.829 mA	IC	Peak switch current in IC
6.	IC Pd	24.99 mW	IC	IC power dissipation
7.	IC Tj	31.784 degC	IC	IC junction temperature
8.	ICThetaJA Effective	71.4 degC/W	IC	Effective IC Junction-to-Ambient Thermal Resistance
9.	Iin Avg	132.31 mA	IC	Average input current
10.	L Ipp	1.206 A	Inductor	Peak-to-peak inductor ripple current
11.	L Pd	2.378 mW	Inductor	Inductor power dissipation
12.	Cin Pd	544.09 $\mu$ W	Power	Input capacitor power dissipation
13.	Cout Pd	92.721 $\mu$ W	Power	Output capacitor power dissipation
14.	IC Pd	24.99 mW	Power	IC power dissipation
15.	L Pd	2.378 mW	Power	Inductor power dissipation
16.	Total Pd	28.023 mW	Power	Total Power Dissipation
17.	BOM Count	8	System	Total Design BOM count
18.	Duty Cycle	20.792 %	System Information	Duty cycle
19.	Efficiency	95.927 %	System Information	Steady state efficiency
20.	FootPrint	86.0 mm <sup>2</sup>	System Information	Total Foot Print Area of BOM components
21.	Frequency	693.414 kHz	System Information	Switching frequency
22.	Iout	200.0 mA	System Information	Iout operating point
23.	Mode	PFM	System Information	Conduction Mode
24.	Pout	660.0 mW	System Information	Total output power

#	Name	Value	Category	Description
25.	Total BOM	NA	System Information	Total BOM Cost
26.	Vin	5.2 V	System Information	Vin operating point
27.	Vout	3.3 V	System Information	Operational Output Voltage
28.	Vout Actual	3.318 V	System Information	Vout Actual calculated based on selected voltage divider resistors
29.	Vout Tolerance	2.671 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
30.	Vout p-p	9.896 mV	System Information	Peak-to-peak output ripple voltage

## Design Inputs

Name	Value	Description
Iout	200.0 m	Maximum Output Current
VinMax	5.2	Maximum input voltage
VinMin	5.0	Minimum input voltage
Vout	3.3	Output Voltage
base_pn	TPS62825	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 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 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.

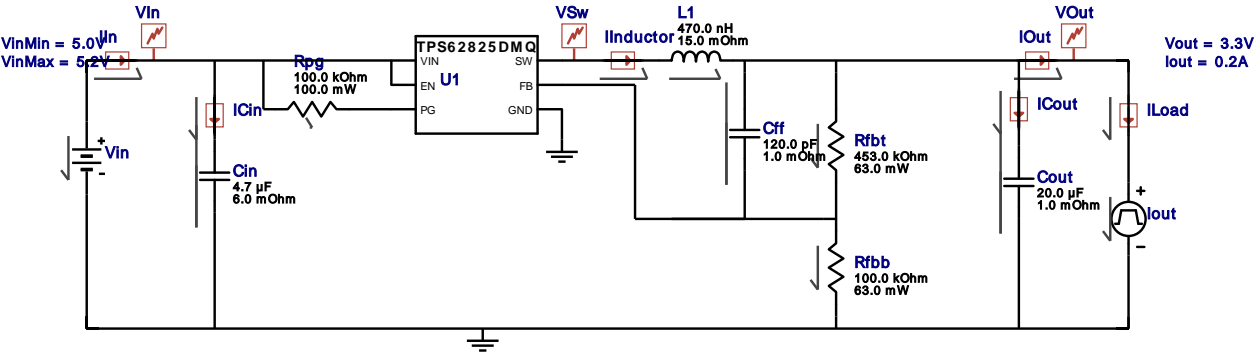
### Load Testing

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.



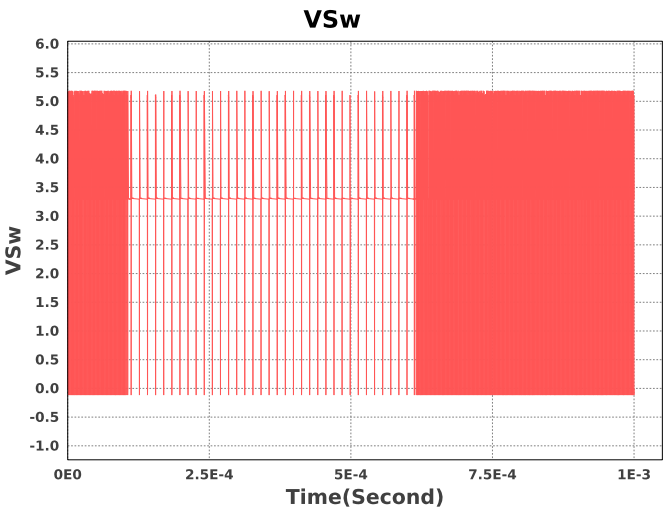
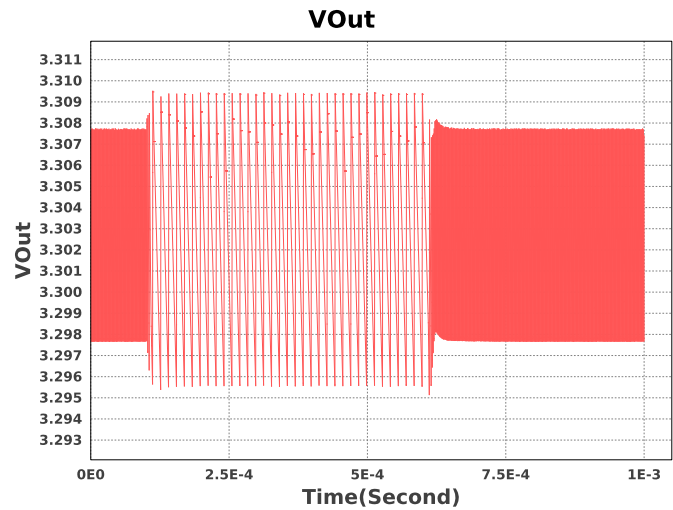
WEBENCH® Electrical Simulation Report

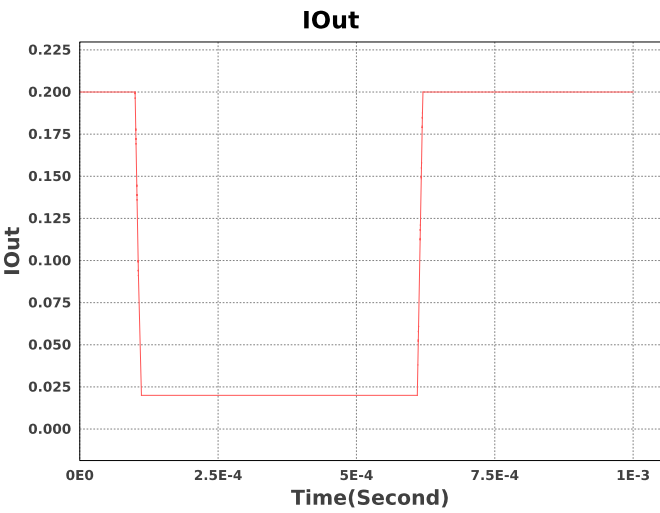
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Simulation Type = Load Transient



Simulation Parameters

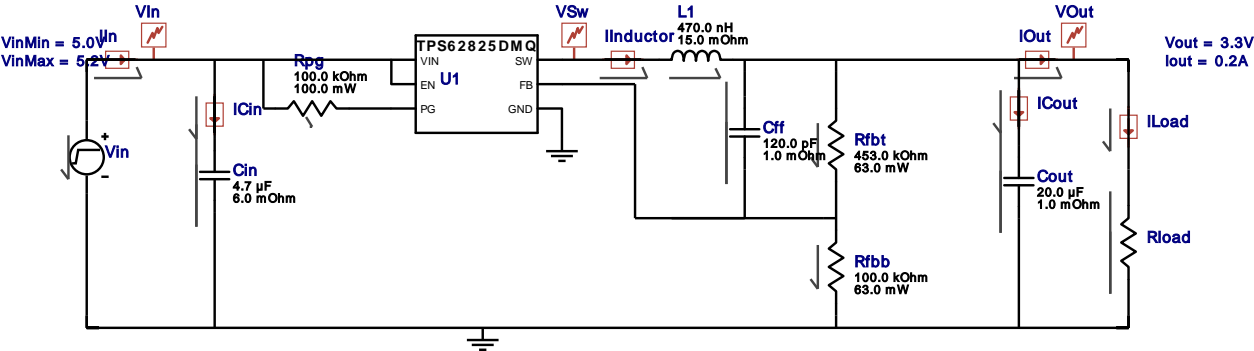
#	Name	Parameter Name	Description	Values
1.	Cout	IC	Initial Voltage	3.3 V
2.	L1	IC	Initial Current	0.2 A
3.	Iload	I	Load Current	Iload1 A
4.	Iout	signal_type	Signal Type	PULSE
		I1	Initial Load Current	0.2 A
		I2	Minimum Load Current	0.02 A
		Td	Initial Time Delay	0.1m s
		Tf	Fall Time	10u s
		Tr	Rise Time	10u s
		Pw	Pulse Width	0.5m s





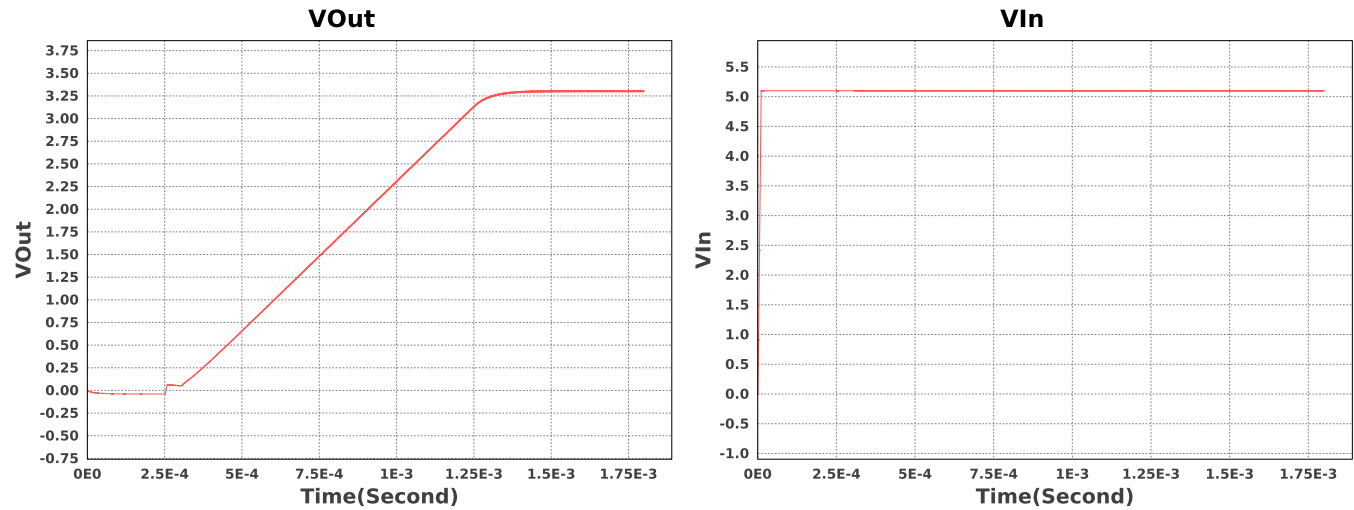


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Simulation Type = Startup

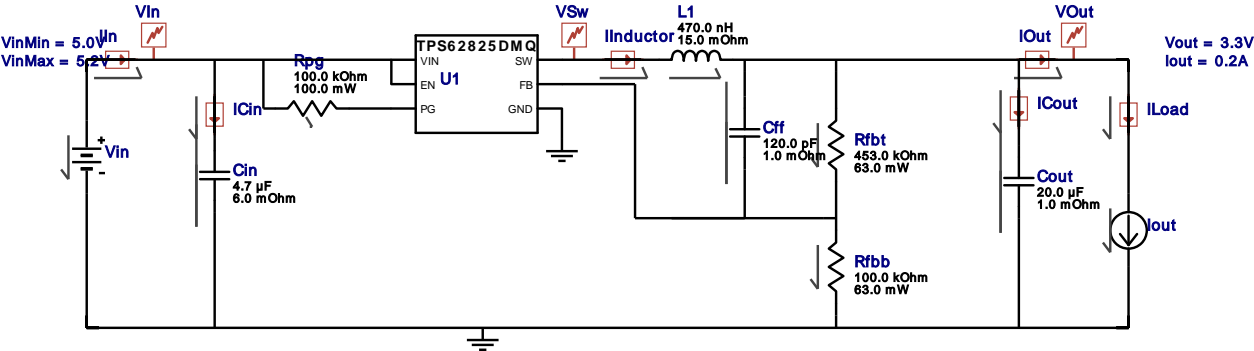


Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Rload	R	Load Resistance	16.499999999999996 Ohm

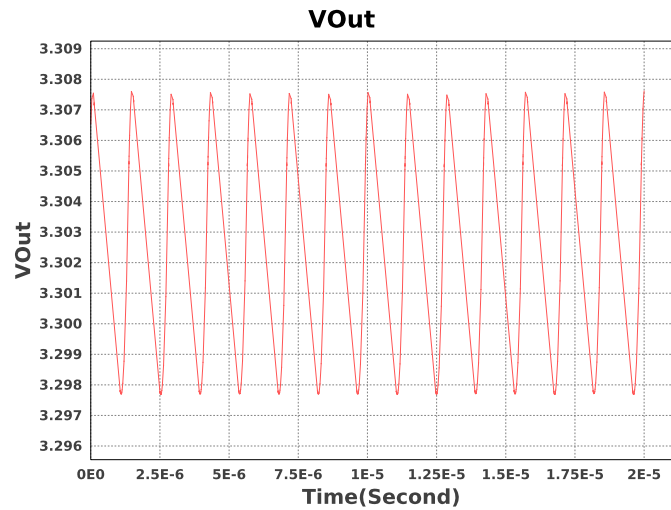


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Simulation Type = Steady State



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cout	IC	Initial Voltage	3.3 V
2.	L1	IC	Initial Current	0.2 A
3.	Iout	I	Load Current	0.2 A



Design Assistance

- 1. Master key : 7719BB1D6D238C66FBD5BE51ECD94750[v1]
- 2. **TPS62825** Product Folder : <http://www.ti.com/product/TPS62825> : contains the data sheet and other resources.

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