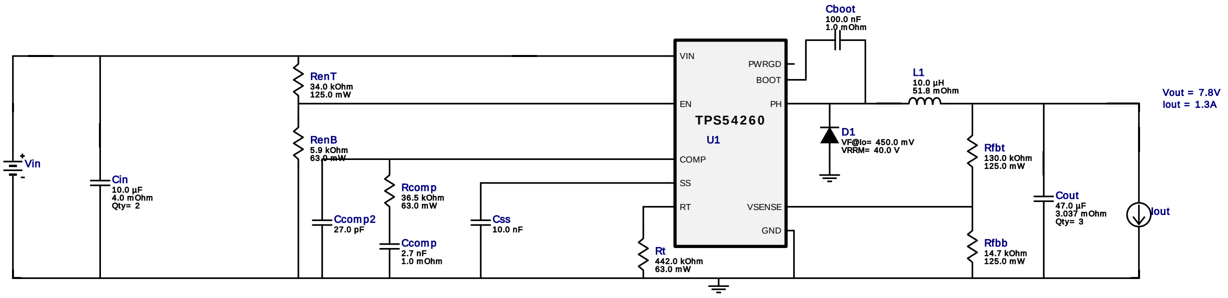
VinMin = 8.53V
VinMax = 9.0V
Vout = 7.8V
Iout = 1.3A

Device = TPS54260DGQR
Topology = Buck
Created = 2025-05-19 09:19:13.204
BOM Cost = $3.11
BOM Count = 18
Total Pd = 0.73W

WEBENCH ® Design Report

Design : 11 TPS54260DGQR
TPS54260DGQR 8.53V-9V to 7.80V @ 1.3A

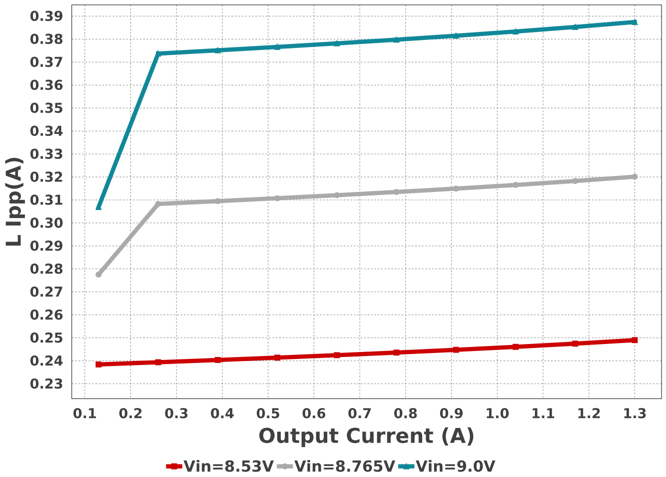


Electrical BOM

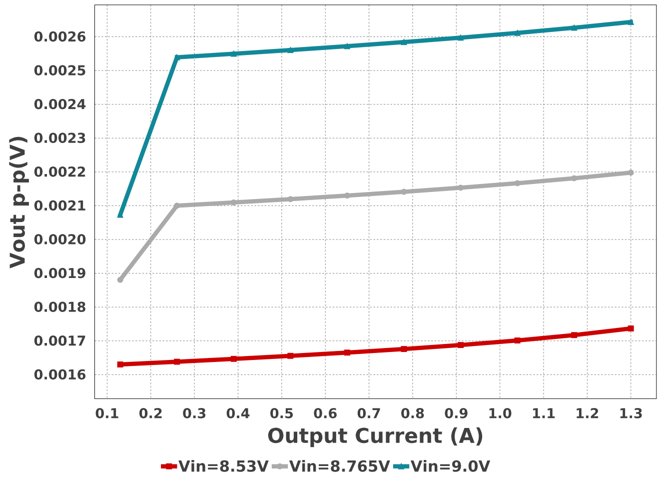
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cboot	MuRata	GRM155R71A104KA01D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
Ccomp	MuRata	GRM216R71E272KA01D Series= X7R	Cap= 2.7 nF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²
Ccomp2	TDK	CGA1A2C0G1E270J030BA Series= C0G/NP0	Cap= 27.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
Cin	MuRata	GRM31CR71E106KA12L Series= X7R	Cap= 10.0 uF ESR= 4.0 mOhm VDC= 25.0 V IRMS= 6.0 A	2	$0.06	1206_180 11 mm²
Cout	MuRata	GRM32ER61C476KE15L Series= X5R	Cap= 47.0 uF ESR= 3.037 mOhm VDC= 16.0 V IRMS= 4.59346 A	3	$0.17	1210_280 15 mm²
Css	Kemet	C0603C103K3GACTU Series= C0G/NP0	Cap= 10.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.08	0603 5 mm²
D1	Diodes Inc.	B340LA-13-F	VF@Io= 450.0 mV VRRM= 40.0 V	1	$0.15	SMA 37 mm²
L1	Vishay-Dale	IHLP3232DZER100M11	L= 10.0 µH 51.8 mOhm	1	$0.71	IHLP-3232DZ 112 mm²
Rcomp	Yageo	AC0402FR-0736K5L Series= ?	Res= 36.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
RenB	Vishay-Dale	CRCW04025K90FKED Series= CRCW..e3	Res= 5.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
RenT	Vishay-Dale	CRCW080534K0FKEA Series= CRCW..e3	Res= 34.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
Rfbb	Yageo	RT0805BRD0714K7L Series= ?	Res= 14.7 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.04	0805 7 mm²

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Rfbt	Yageo	RT0805BRD07130KL Series= ?	Res= 130.0 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.04	0805 7 mm^2
Rt	Vishay-Dale	CRCW0402442KFKED Series= CRCW..e3	Res= 442.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
U1	Texas Instruments	TPS54260DGQR	Switcher	1	$1.38	S-PDSO-G10 24 mm^2

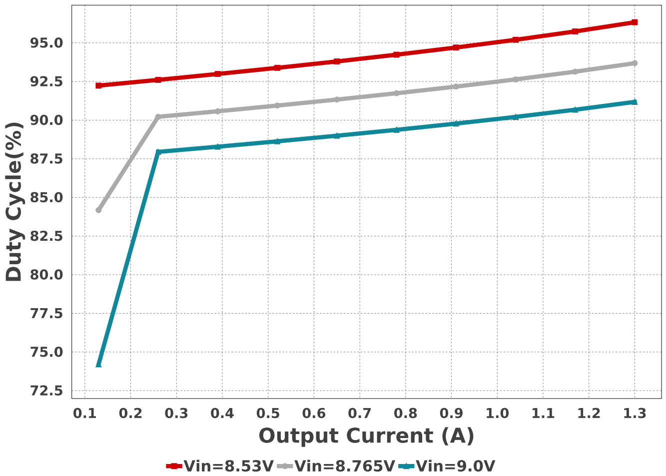
L Ipp



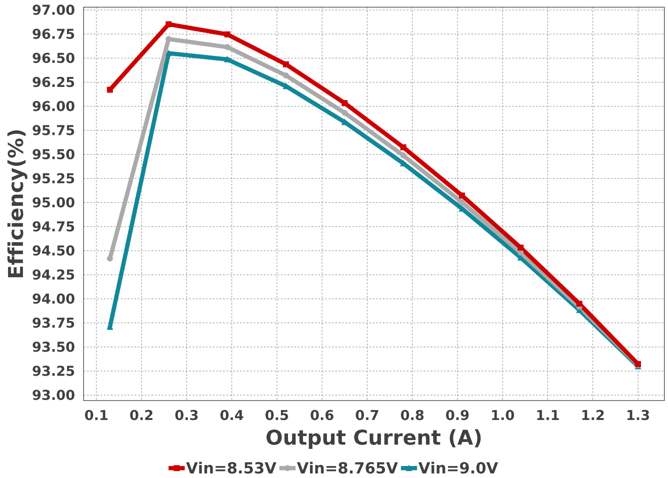
Vout p-p



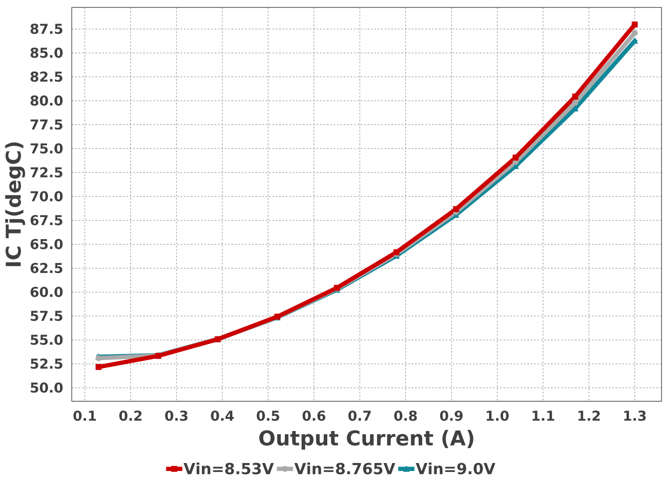
Duty Cycle



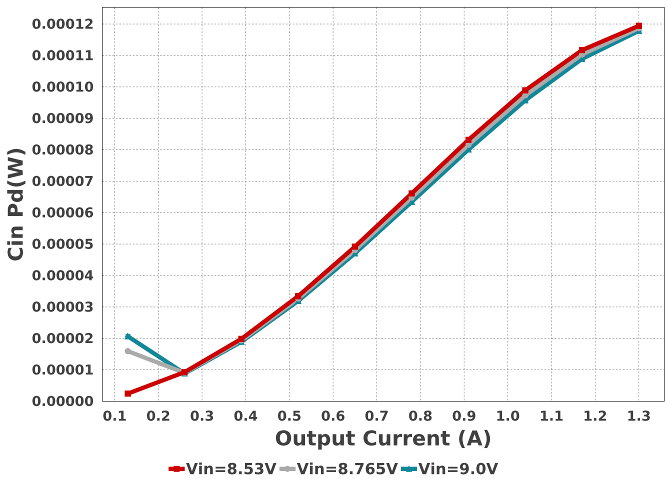
Efficiency

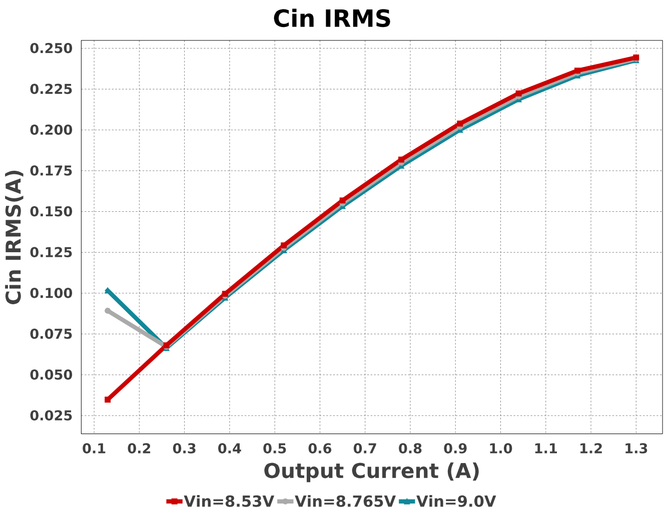


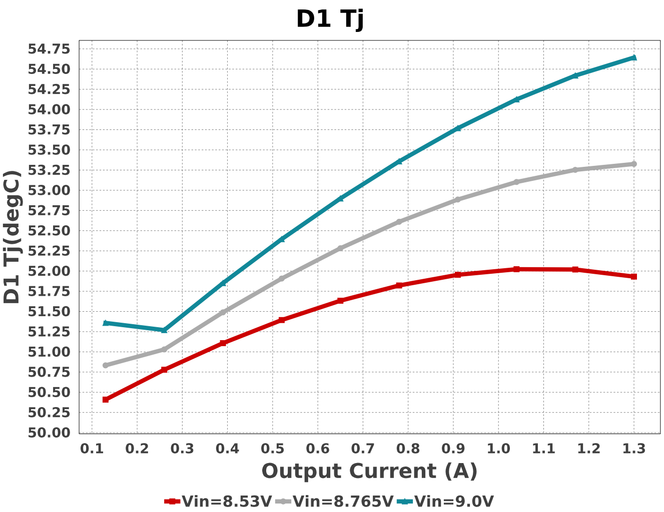
IC Tj

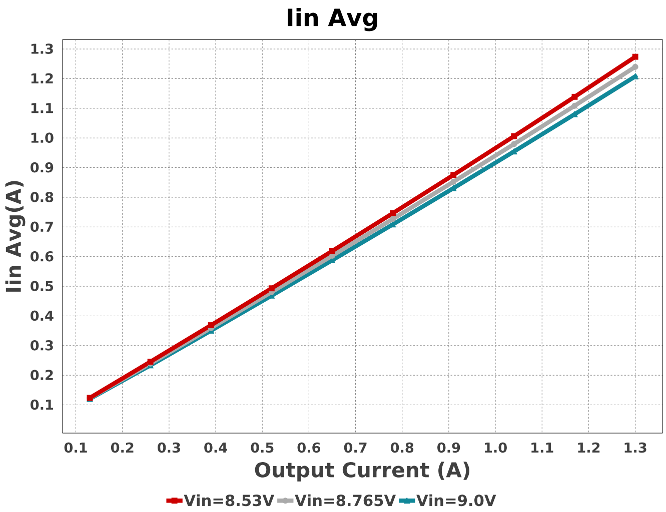


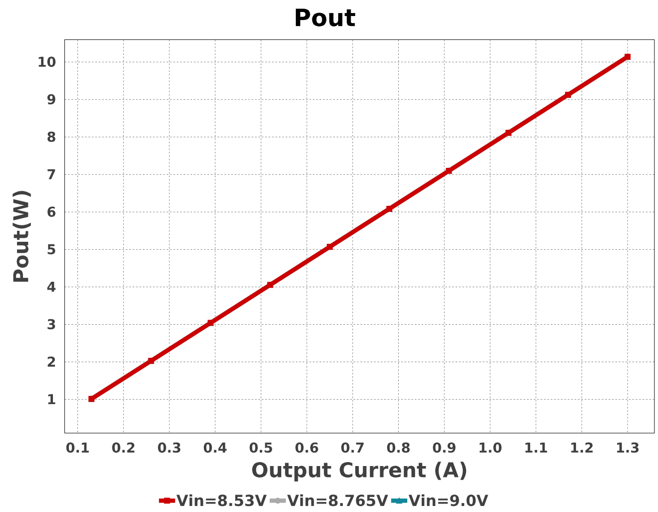
Cin Pd

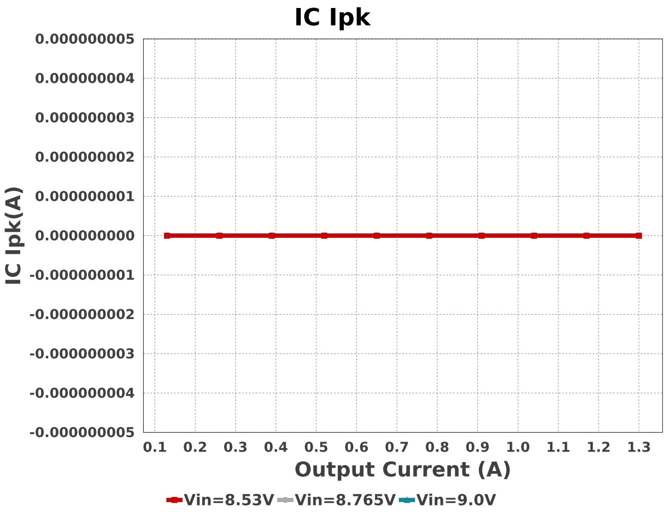


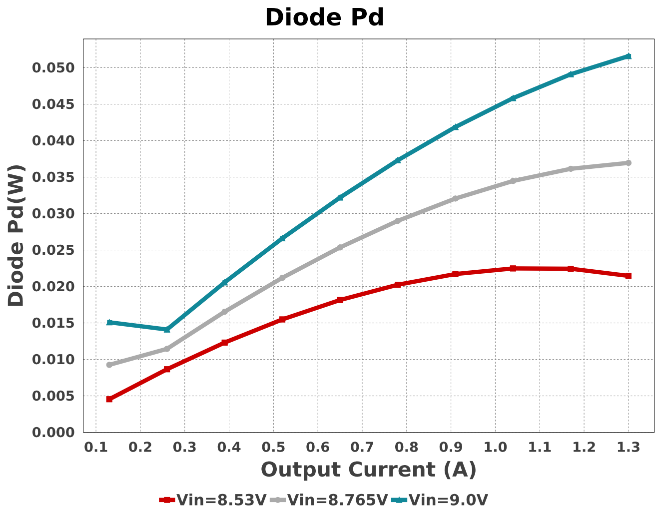

Cin IRMS
Cin IRMS(A)
Output Current (A)
Vin=8.53V Vin=8.765V Vin=9.0V

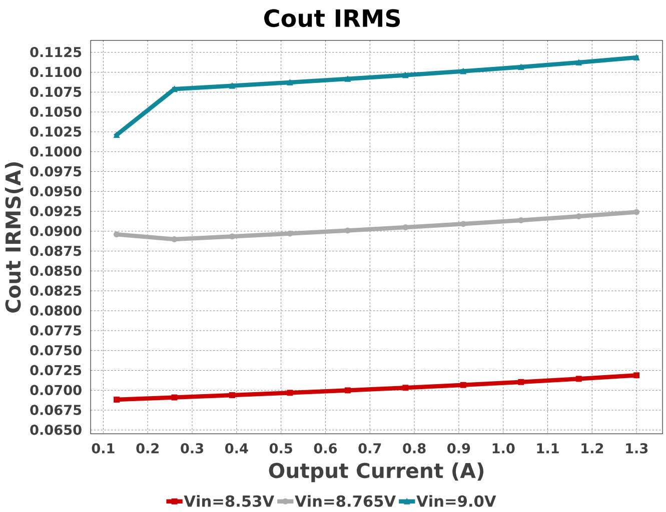

D1 Tj
D1 Tj(degC)
Output Current (A)
Vin=8.53V Vin=8.765V Vin=9.0V

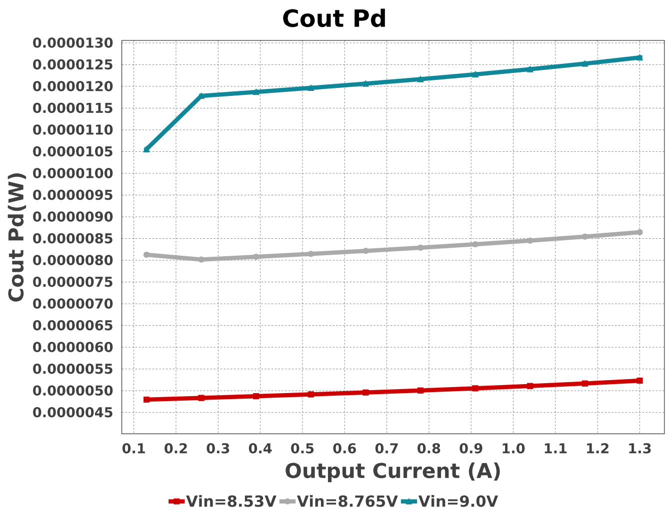

Iin Avg
Iin Avg(A)
Output Current (A)
Vin=8.53V Vin=8.765V Vin=9.0V

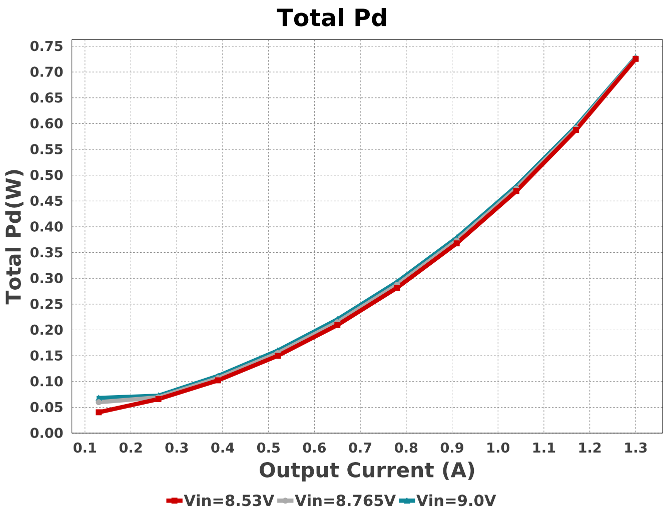

Pout
Pout(W)
Output Current (A)
Vin=8.53V Vin=8.765V Vin=9.0V

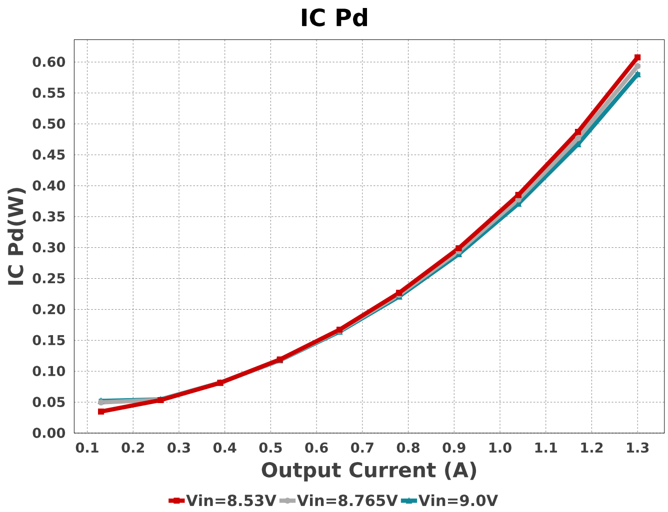

IC Ipk
IC Ipk(A)
Output Current (A)
Vin=8.53V Vin=8.765V Vin=9.0V

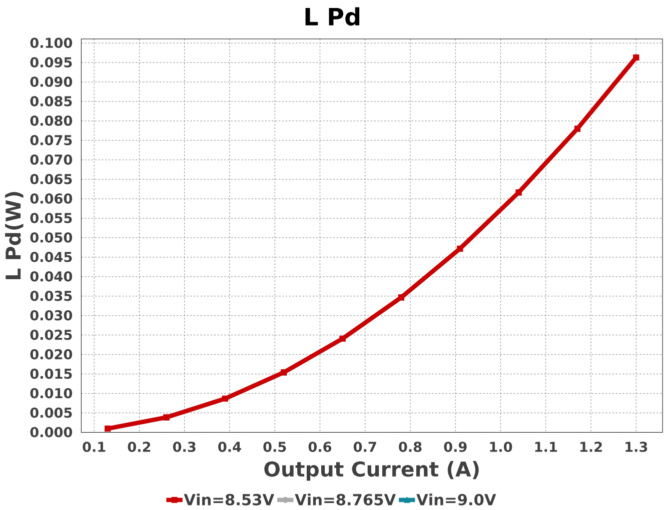

Diode Pd
Diode Pd(W)
Output Current (A)
Vin=8.53V Vin=8.765V Vin=9.0V

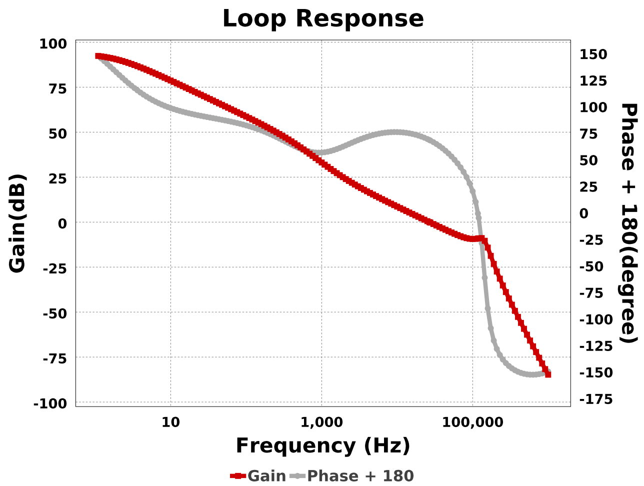












Operating Values

#	Name	Value	Category	Description
1.	BOM Count	18		Total Design BOM count
2.	Total BOM	$3.109		Total BOM Cost
3.	Cin IRMS	242.711 mA	Capacitor	Input capacitor RMS ripple current
4.	Cin Pd	117.82 µW	Capacitor	Input capacitor power dissipation
5.	Cout IRMS	111.846 mA	Capacitor	Output capacitor RMS ripple current
6.	Cout Pd	12.664 µW	Capacitor	Output capacitor power dissipation
7.	D1 Tj	54.643 degC	Diode	D1 junction temperature
8.	Diode Pd	51.59 mW	Diode	Diode power dissipation
9.	IC Ipk	0.0 A	IC	Peak switch current in IC
10.	IC Pd	580.3 mW	IC	IC power dissipation
11.	IC Tj	86.269 degC	IC	IC junction temperature

#	Name	Value	Category	Description
12.	ICThetaJA	62.5 degC/W	IC	IC junction-to-ambient thermal resistance
13.	Iin Avg	1.208 A	IC	Average input current
14.	L Ipp	387.445 mA	Inductor	Peak-to-peak inductor ripple current
15.	L Pd	96.296 mW	Inductor	Inductor power dissipation
16.	Cin Pd	117.82 µW	Power	Input capacitor power dissipation
17.	Cout Pd	12.664 µW	Power	Output capacitor power dissipation
18.	Diode Pd	51.59 mW	Power	Diode power dissipation
19.	IC Pd	580.3 mW	Power	IC power dissipation
20.	L Pd	96.296 mW	Power	Inductor power dissipation
21.	Total Pd	728.291 mW	Power	Total Power Dissipation
22.	Cross Freq	26.709 kHz	System Information	Bode plot crossover frequency
23.	Duty Cycle	91.181 %	System Information	Duty cycle
24.	Efficiency	93.299 %	System Information	Steady state efficiency
25.	FootPrint	284.0 mm^2	System Information	Total Foot Print Area of BOM components
26.	Frequency	282.408 kHz	System Information	Switching frequency
27.	Gain Marg	-9.089 dB	System Information	Bode Plot Gain Margin
28.	Iout	1.3 A	System Information	Iout operating point
29.	Low Freq Gain	92.371 dB	System Information	Gain at 1Hz
30.	Mode	CCM	System Information	Conduction Mode
31.	Phase Marg	69.275 deg	System Information	Bode Plot Phase Margin
32.	Pout	10.14 W	System Information	Total output power
33.	Vin	9.0 V	System Information	Vin operating point
34.	Vout	7.8 V	System Information	Operational Output Voltage
35.	Vout Actual	7.875 V	System Information	Vout Actual calculated based on selected voltage divider resistors
36.	Vout Tolerance	1.182 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
37.	Vout p-p	2.644 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	1.3	Maximum Output Current
SoftStart	2.18 ms	Soft Start Time (ms)
VinMax	9.0	Maximum input voltage
VinMin	8.53	Minimum input voltage
Vout	7.8	Output Voltage
base_pn	TPS54260	Base Product Number
source	DC	Input Source Type
Ta	50.0	Ambient temperature
UserFsw	282.0 k	Customer Selected Frequency

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

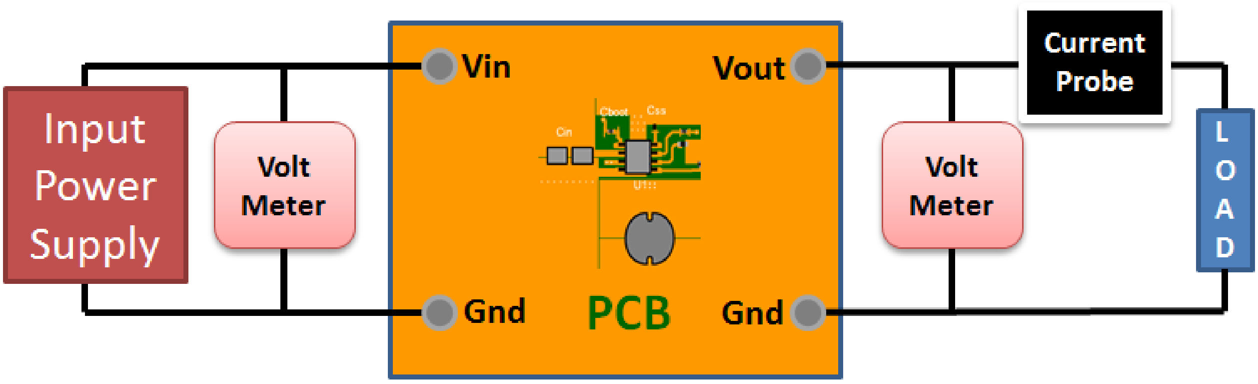
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. 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 8.53V 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 Iout 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.

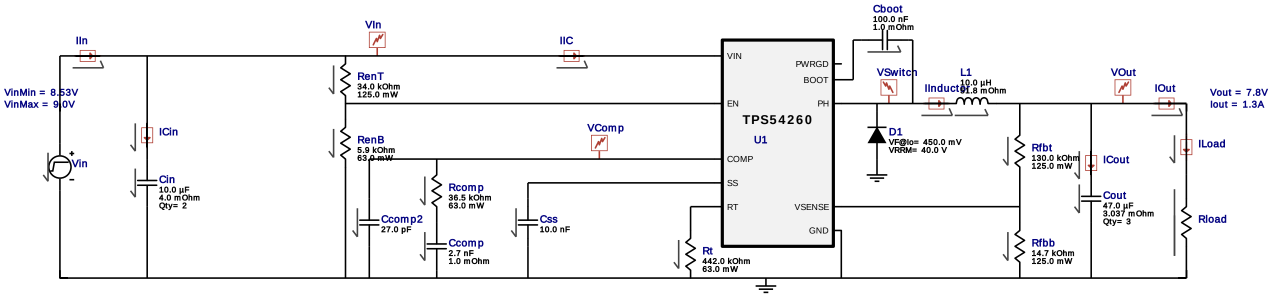


WEBENCH® Electrical Simulation Report

Design Id = 11

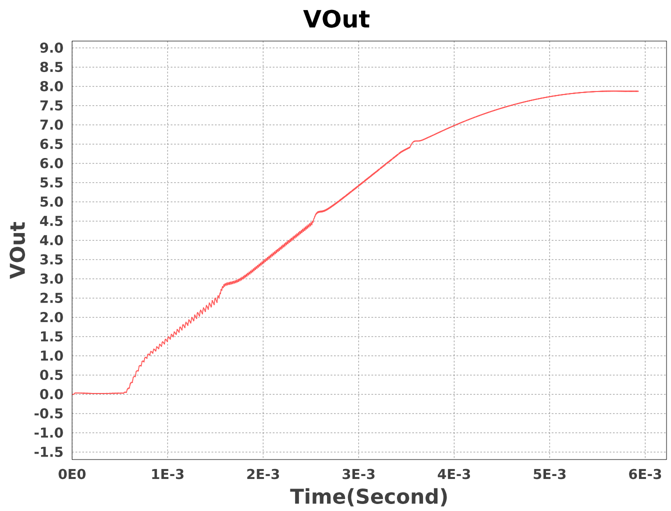
sim_id = 18

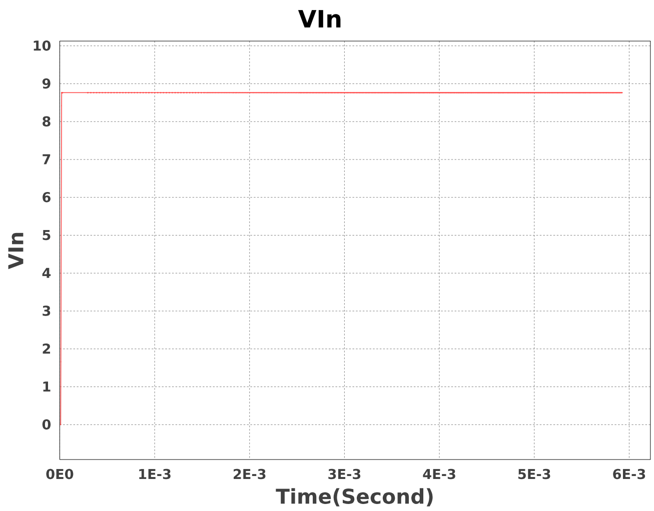
Simulation Type = Startup



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Rload	R	Load Resistance	6.0 Ohm

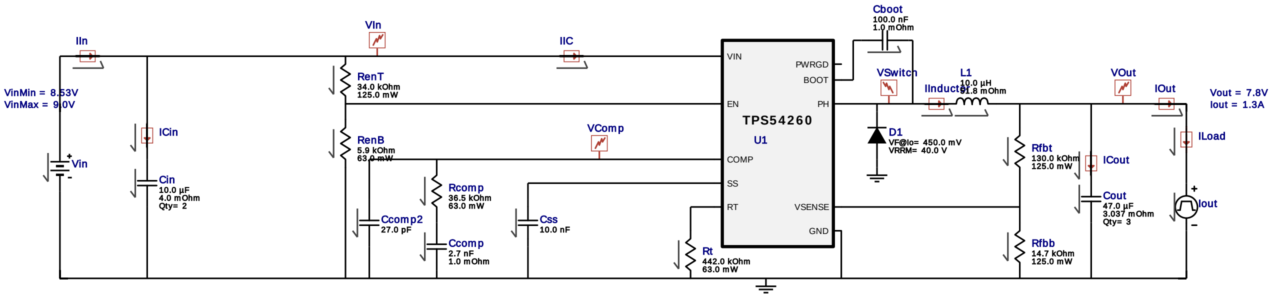




Design Id = 11

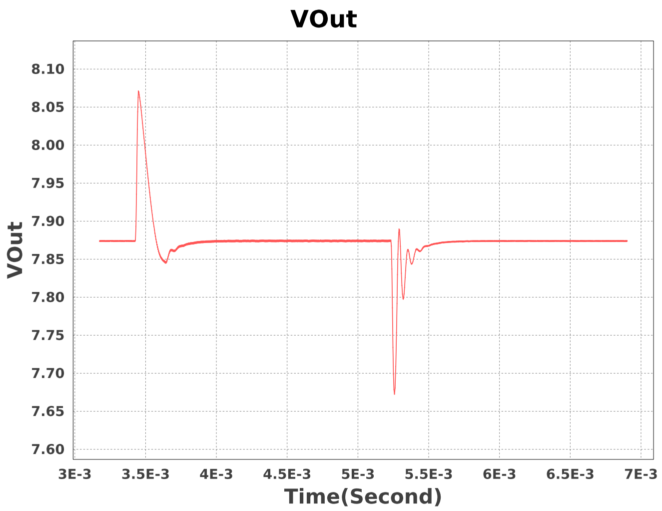
sim_id = 19

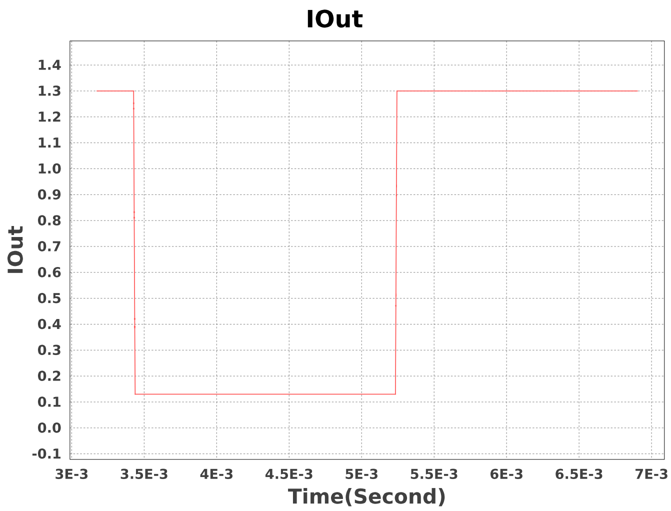
Simulation Type = Load Transient



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cboot	IC	Initial Condition	8.765 V
2.	Cout	IC	Initial Voltage	7.8 V
3.	Iout	signal_type	Signal Type	PULSE
		I1	Initial Load Current	1.3 A
		I2	Minimum Load Current	0.13 A
		Td	Initial Time Delay	0.003427221196259437 s
		Tf	Fall Time	10u s
		Tr	Rise Time	10u s
		Pw	Pulse Width	0.00179626264609118 s

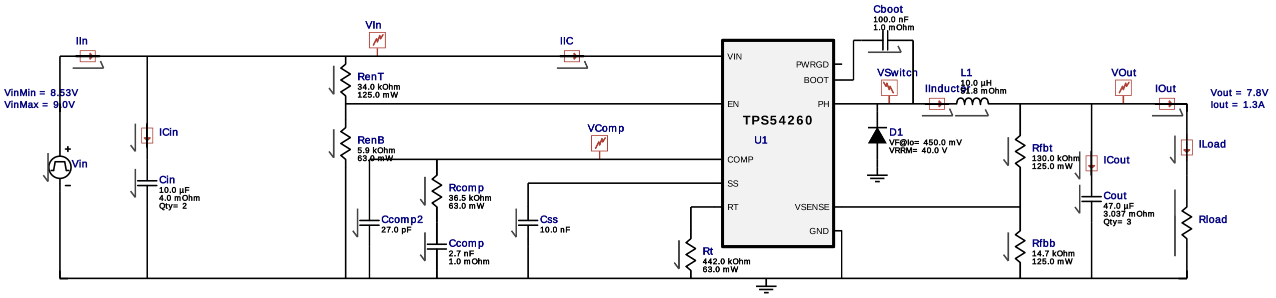




Design Id = 11

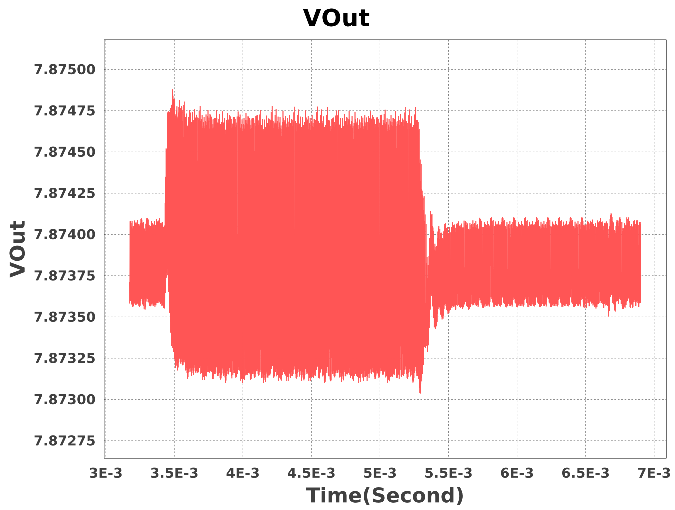
sim_id = 20

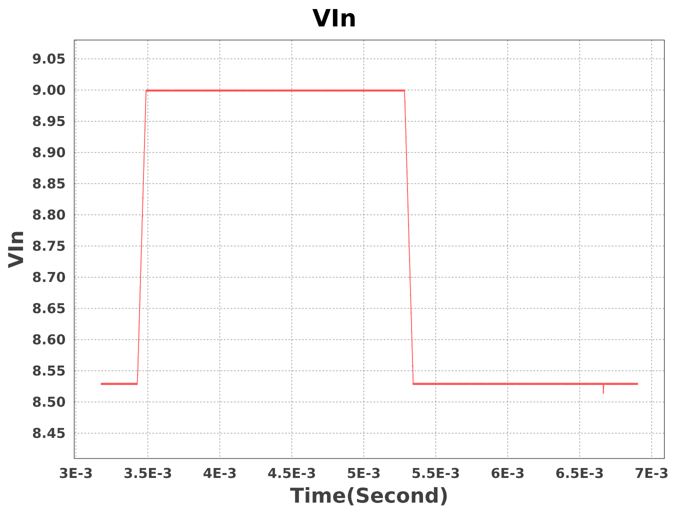
Simulation Type = Input Transient



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cboot	IC	Initial Condition	8.765 V
2.	L1	IC	Initial Current	1.3 A
3.	Cout	IC	Initial Voltage	7.8 V
4.	Rload	R	Load Resistance	6.0 Ohm

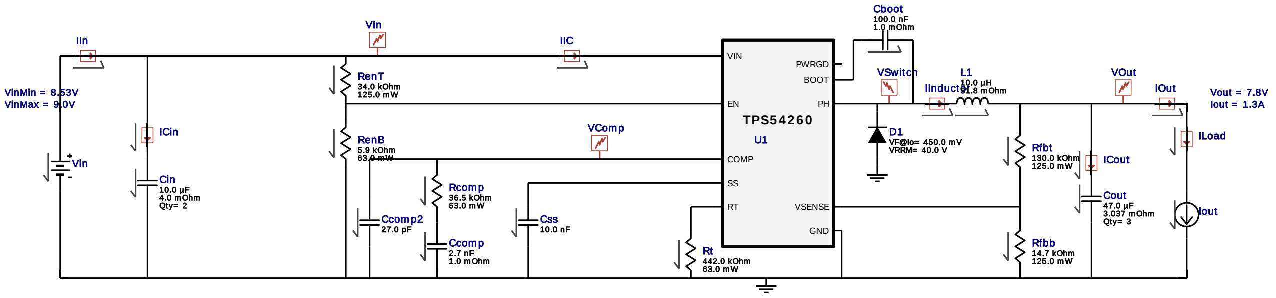




Design Id = 11

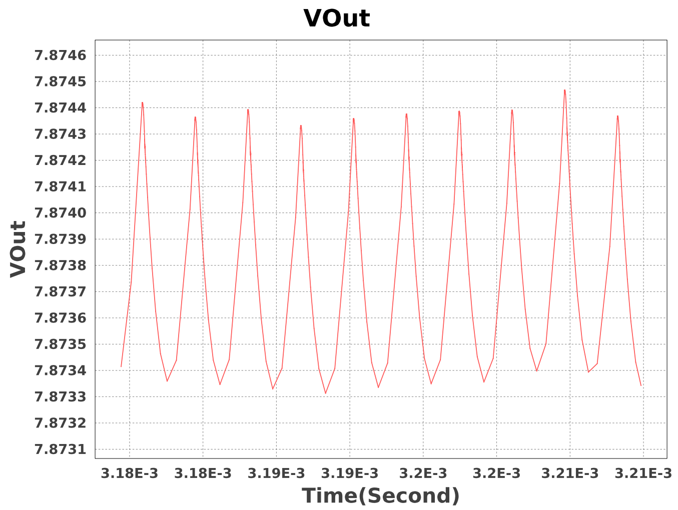
sim_id = 21

Simulation Type = Steady State



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cboot	IC	Initial Condition	10.0 V
2.	L1	IC	Initial Current	1.3 A
3.	Cout	IC	Initial Voltage	7.8 V
4.	Iout	I	Load Current	1.3 A



Design Assistance

1. Master key : B329607443D21499[v1]

2. **TPS54260** Product Folder : http://www.ti.com/product/TPS54260 : contains the data sheet and other resources.