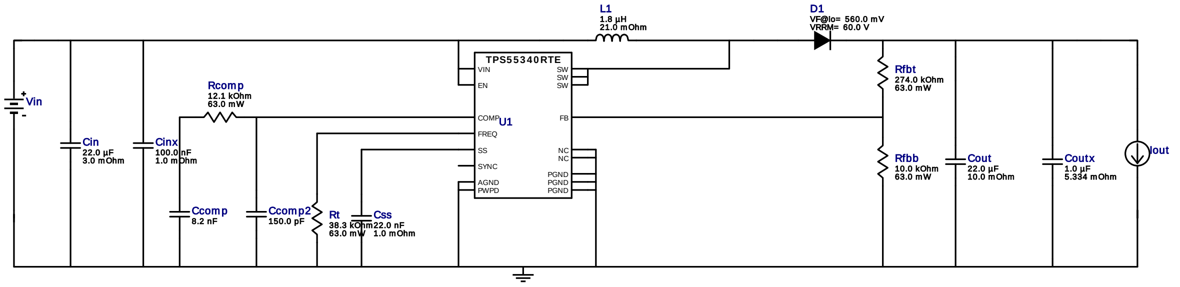
VinMin = 3.0V VinMax = 3.0V Vout = 35.0V Iout = 0.3A	Device = TPS55340RTER Topology = Boost Created = 2023-01-27 07:26:16.186 BOM Cost = $4.59 BOM Count = 14 Total Pd = 1.69W

WEBENCH ® Design Report

Design : 62 TPS55340RTER
TPS55340RTER 3V-3V to 35.00V @ 0.3A

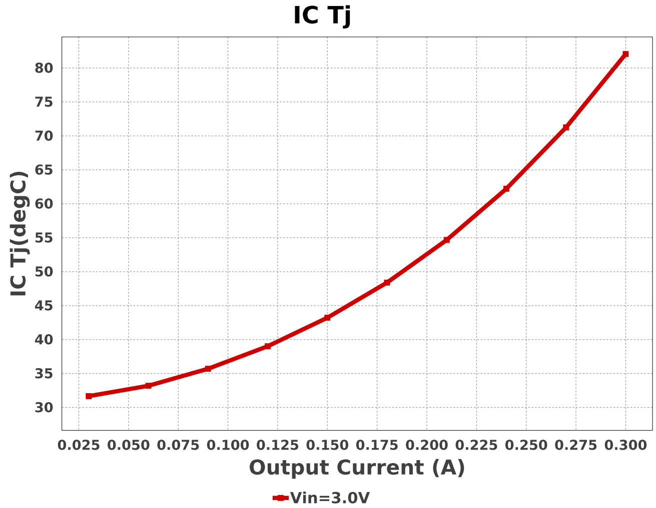


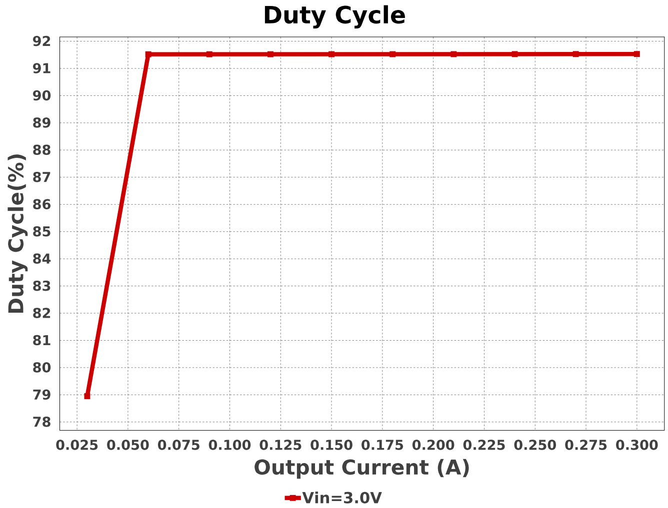
1. For frequency > 1.2 MHz, the user is required to make sure load current is always greater than "Iout Min" value shown in the Op Vals.

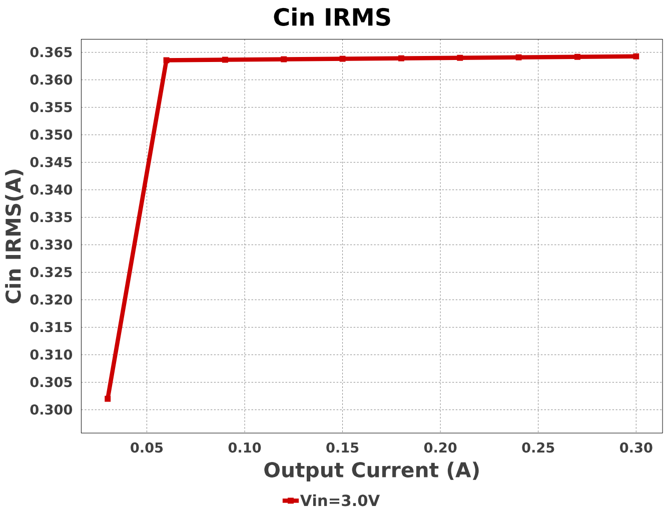
Electrical BOM

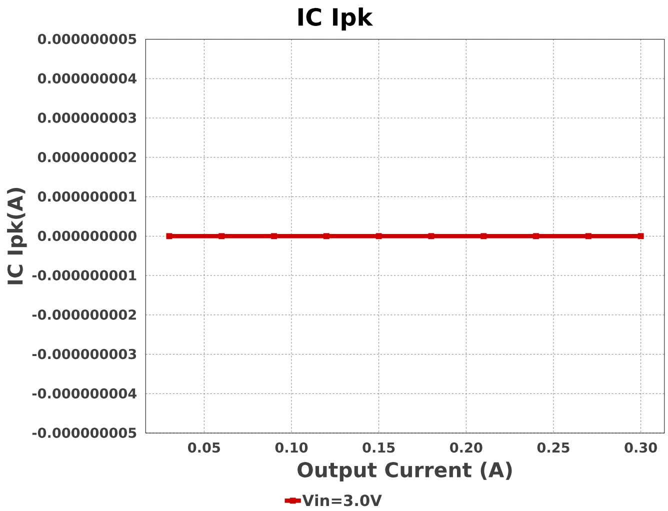
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Ccomp	TDK	CGA3E2C0G1H822J080AA Series= C0G/NP0	Cap= 8.2 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.05	0603 5 mm²
Ccomp2	Taiyo Yuden	UMK105CG151JV-F Series= C0G/NP0	Cap= 150.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
Cin	MuRata	GRM21BR61A226ME44L Series= X5R	Cap= 22.0 uF ESR= 3.0 mOhm VDC= 10.0 V IRMS= 3.84 A	1	$0.09	0805 7 mm²
Cinx	MuRata	GRM155R70J104KA01D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
Cout	TDK	CKG57NX5R1H226M500JH Series= X5R	Cap= 22.0 uF ESR= 10.0 mOhm VDC= 50.0 V IRMS= 4.6 A	1	$1.77	CKG57N 56 mm²
Coutx	MuRata	GRM31CR72A105KA01L Series= X7R	Cap= 1.0 uF ESR= 5.334 mOhm VDC= 100.0 V IRMS= 1.55432 A	1	$0.11	1206_190 11 mm²
Css	MuRata	GRM155R71C223KA01D Series= X7R	Cap= 22.0 nF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
D1	Diodes Inc.	PDS760-13	VF@Io= 560.0 mV VRRM= 60.0 V	1	$0.36	PowerDI5 50 mm²
L1	Wurth Elektronik	74438357018	L= 1.8 µH 21.0 mOhm	1	$1.22	WE-MAPI_4030 26 mm²
Rcomp	Yageo	AC0402FR-0712K1L Series= ?	Res= 12.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

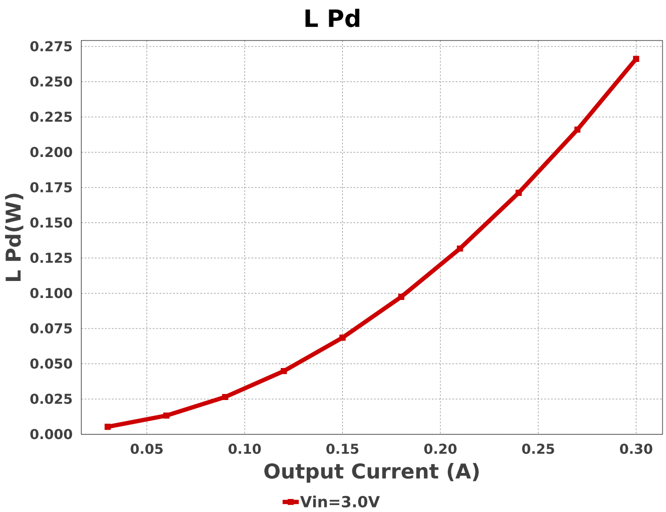
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Rfbt	Vishay-Dale	CRCW0402274KFKED Series= CRCW..e3	Res= 274.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
Rt	Vishay-Dale	CRCW040238K3FKED Series= CRCW..e3	Res= 38.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
U1	Texas Instruments	TPS55340RTER	Switcher	1	$0.92	RTE0016C 16 mm^2

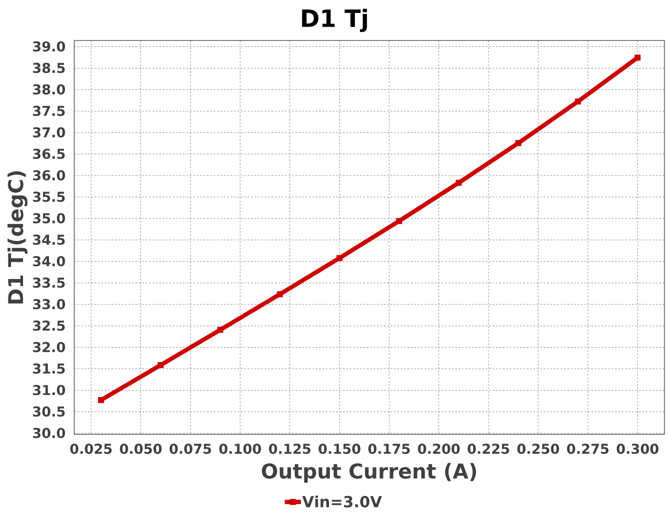


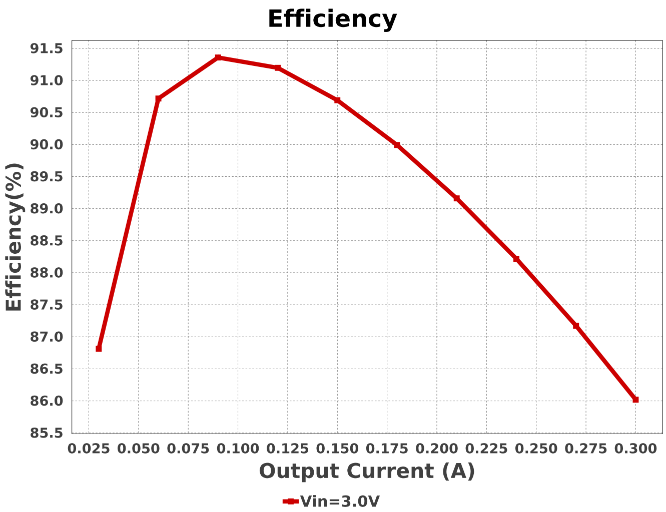


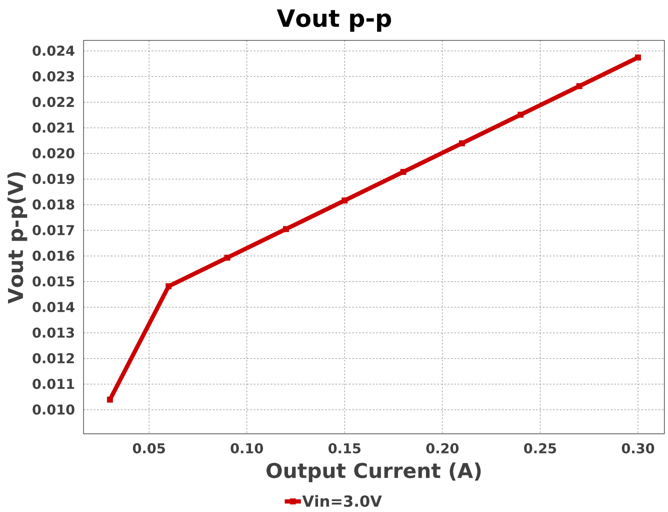


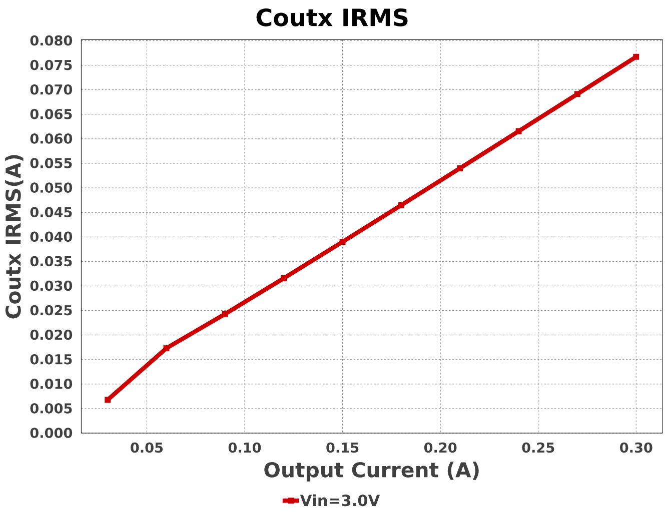


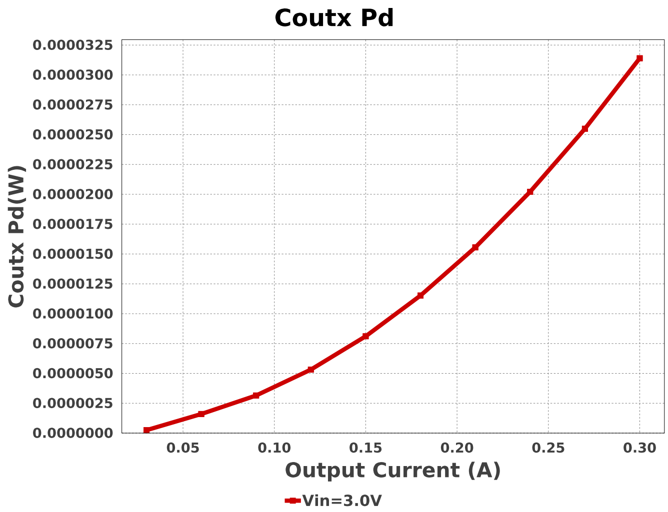


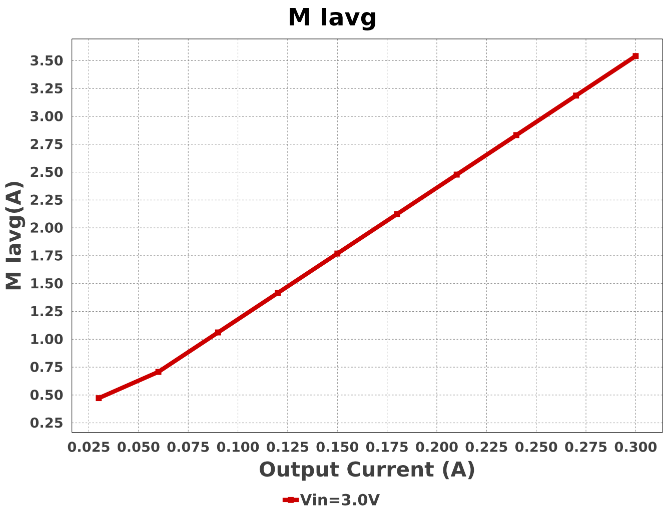


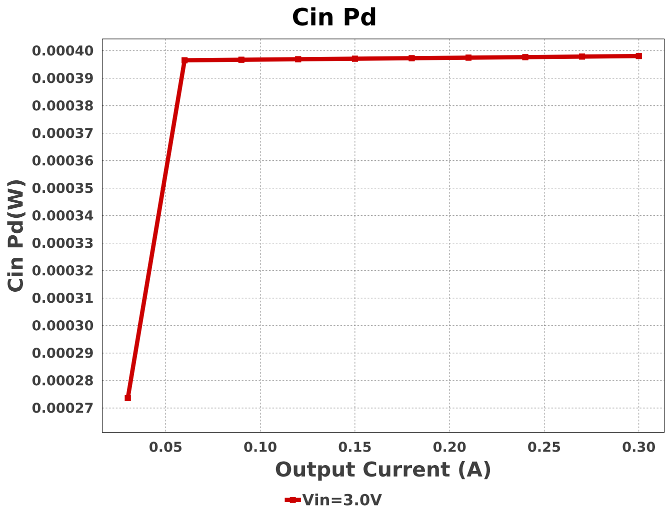

Efficiency
Efficiency(%)
91.5
91.0
90.5
90.0
89.5
89.0
88.5
88.0
87.5
87.0
86.5
86.0
85.5
0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200 0.225 0.250 0.275 0.300
Output Current (A)
Vin=3.0V

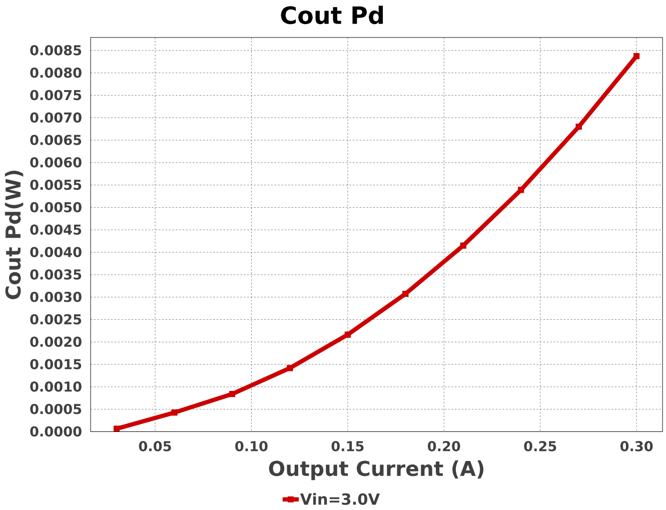

Vout p-p
Vout p-p(V)
0.024
0.023
0.022
0.021
0.020
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.05 0.10 0.15 0.20 0.25 0.30
Output Current (A)
Vin=3.0V

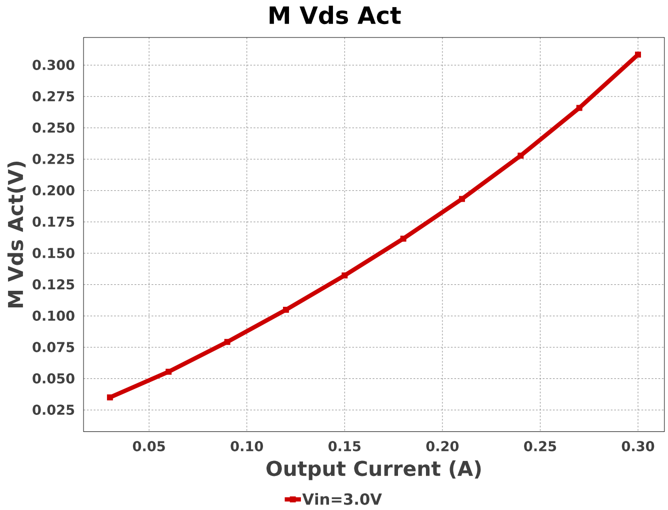

Coutx IRMS
Coutx IRMS(A)
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.05 0.10 0.15 0.20 0.25 0.30
Output Current (A)
Vin=3.0V

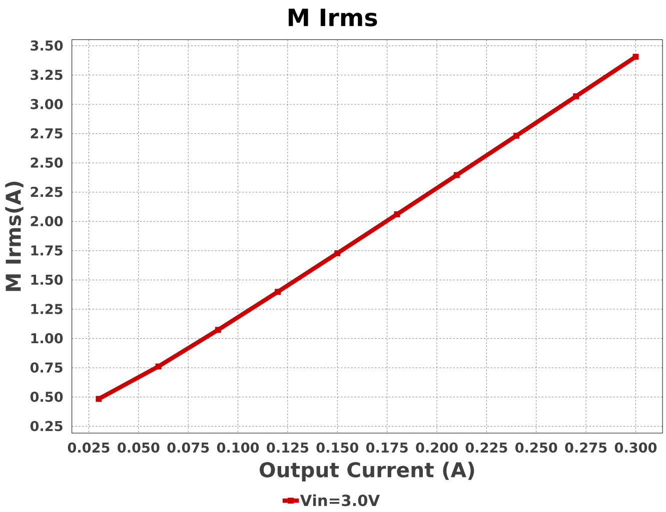

Coutx Pd
Coutx Pd(W)
0.0000325
0.0000300
0.0000275
0.0000250
0.0000225
0.0000200
0.0000175
0.0000150
0.0000125
0.0000100
0.0000075
0.0000050
0.0000025
0.0000000
0.05 0.10 0.15 0.20 0.25 0.30
Output Current (A)
Vin=3.0V

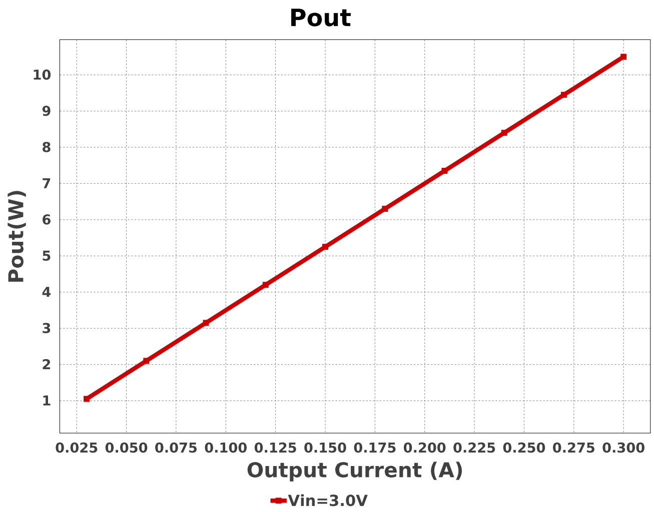

M Iavg
M Iavg(A)
3.50
3.25
3.00
2.75
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200 0.225 0.250 0.275 0.300
Output Current (A)
Vin=3.0V

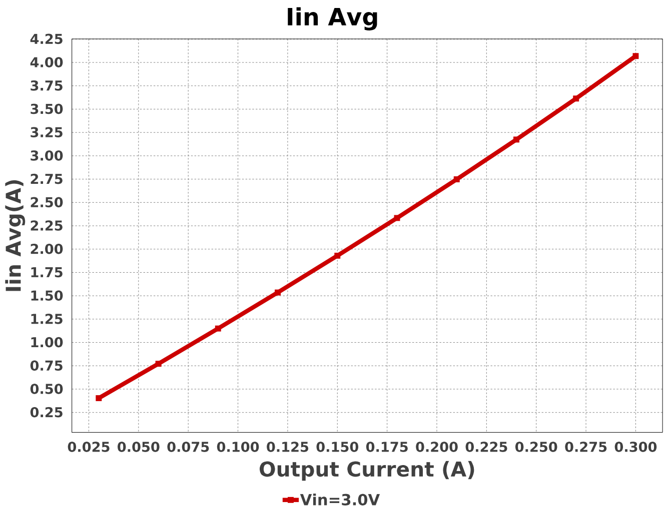

Cin Pd
Cin Pd(W)
0.00040
0.00039
0.00038
0.00037
0.00036
0.00035
0.00034
0.00033
0.00032
0.00031
0.00030
0.00029
0.00028
0.00027
0.05 0.10 0.15 0.20 0.25 0.30
Output Current (A)
Vin=3.0V

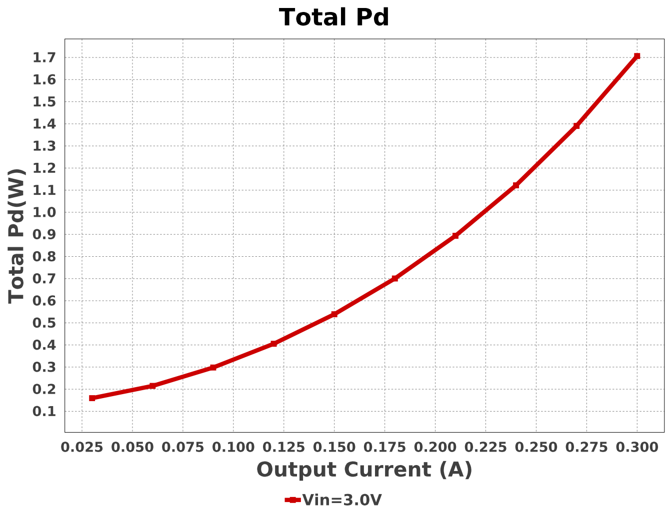

Cout Pd
Cout Pd(W)
Output Current (A)
Vin=3.0V

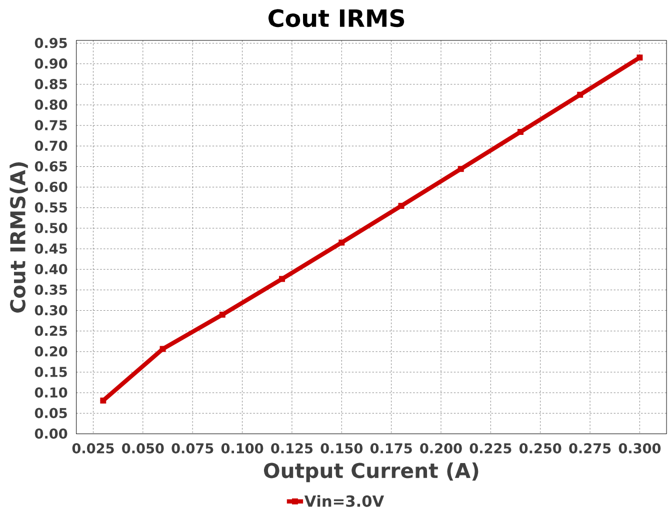

M Vds Act
M Vds Act(V)
Output Current (A)
Vin=3.0V

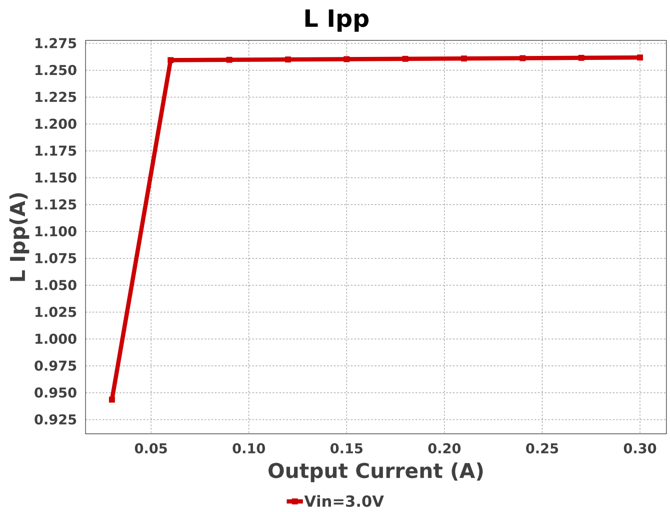

M Irms
M Irms(A)
Output Current (A)
Vin=3.0V

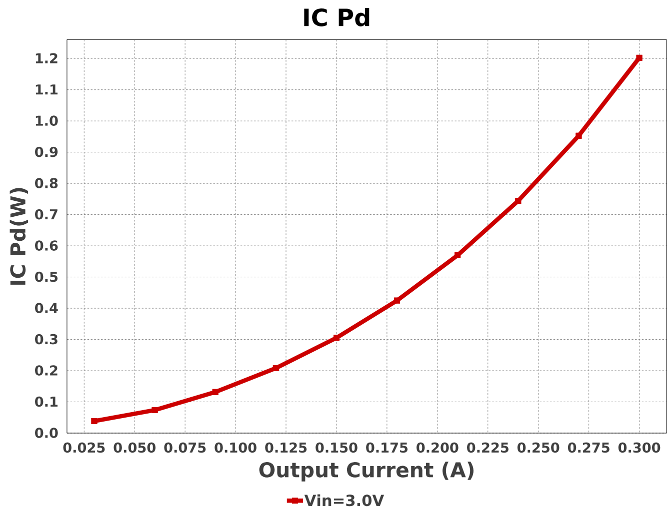

Pout
Pout(W)
Output Current (A)
Vin=3.0V

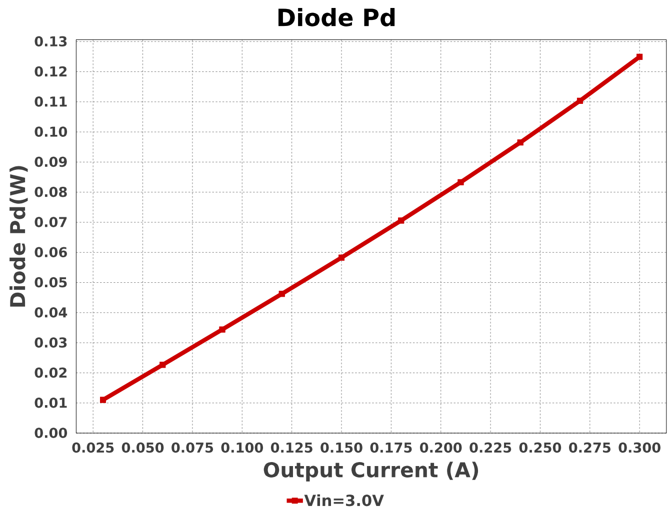

Iin Avg
Iin Avg(A)
Output Current (A)
Vin=3.0V

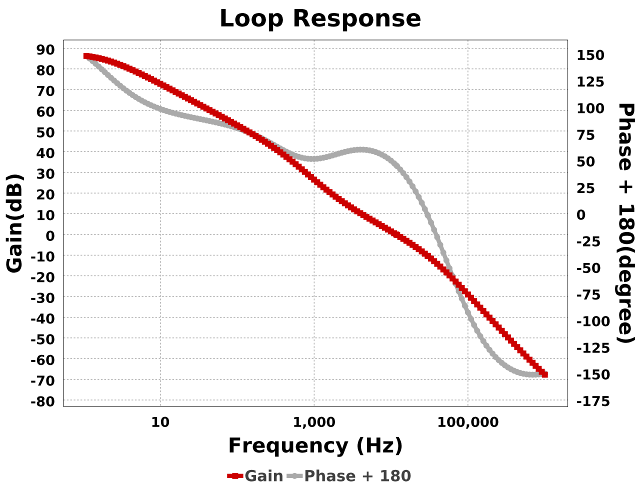

Total Pd
Total Pd(W)
Output Current (A)
Vin=3.0V











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	364.219 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	397.97 µW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	914.38 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	8.361 mW	Capacitor	Output capacitor power dissipation
5.	Coutx IRMS	76.656 mA	Capacitor	Output capacitor_x RMS ripple current
6.	Coutx Pd	31.343 µW	Capacitor	Output capacitor_x power loss
7.	D1 Tj	37.629 degC	Diode	D1 junction temperature
8.	Diode Pd	108.99 mW	Diode	Diode power dissipation
9.	IC Ipk	0.0 A	IC	Peak switch current in IC
10.	IC Pd	1.198 W	IC	IC power dissipation
11.	IC Tj	81.869 degC	IC	IC junction temperature

#	Name	Value	Category	Description
12.	IC Tolerance	9.0 mV	IC	IC Feedback Tolerance
13.	ICThetaJA	43.3 degC/W	IC	IC junction-to-ambient thermal resistance
14.	Iin Avg	4.062 A	IC	Average input current
15.	L Ipp	1.262 A	Inductor	Peak-to-peak inductor ripple current
16.	L Pd	265.4 mW	Inductor	Inductor power dissipation
17.	M Iavg	3.536 A	Mosfet	MOSFET Average current
18.	M Irms	3.401 A	Mosfet	MOSFET RMS ripple current
19.	M Vds Act	307.692 mV	Mosfet	Voltage drop across the MosFET
20.	Cin Pd	397.97 µW	Power	Input capacitor power dissipation
21.	Cout Pd	8.361 mW	Power	Output capacitor power dissipation
22.	Coutx Pd	31.343 µW	Power	Output capacitor_x power loss
23.	Diode Pd	108.99 mW	Power	Diode power dissipation
24.	IC Pd	1.198 W	Power	IC power dissipation
25.	L Pd	265.4 mW	Power	Inductor power dissipation
26.	Total Pd	1.685 W	Power	Total Power Dissipation
27.	BOM Count	14	System Information	Total Design BOM count
28.	Cross Freq	11.684 kHz	System Information	Bode plot crossover frequency
29.	Duty Cycle	91.517 %	System Information	Duty cycle
30.	Efficiency	86.169 %	System Information	Steady state efficiency
31.	FootPrint	191.0 mm^2	System Information	Total Foot Print Area of BOM components
32.	Frequency	1.212 MHz	System Information	Switching frequency
33.	Gain Marg	-10.338 dB	System Information	Bode Plot Gain Margin
34.	Iout	300.0 mA	System Information	Iout operating point
35.	Low Freq Gain	86.277 dB	System Information	Gain at 1Hz
36.	Mode	CCM	System Information	Conduction Mode
37.	Phase Marg	46.664 deg	System Information	Bode Plot Phase Margin
38.	Pout	10.5 W	System Information	Total output power
39.	Total BOM	$4.59	System Information	Total BOM Cost
40.	Vin	3.0 V	System Information	Vin operating point
41.	Vout	35.0 V	System Information	Operational Output Voltage
42.	Vout Actual	34.904 V	System Information	Vout Actual calculated based on selected voltage divider resistors
43.	Vout Tolerance	2.696 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
44.	Vout p-p	23.741 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	300.0 m	Maximum Output Current
VinMax	3.0	Maximum input voltage
VinMin	3.0	Minimum input voltage
Vout	35.0	Output Voltage
base_pn	TPS55340	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 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

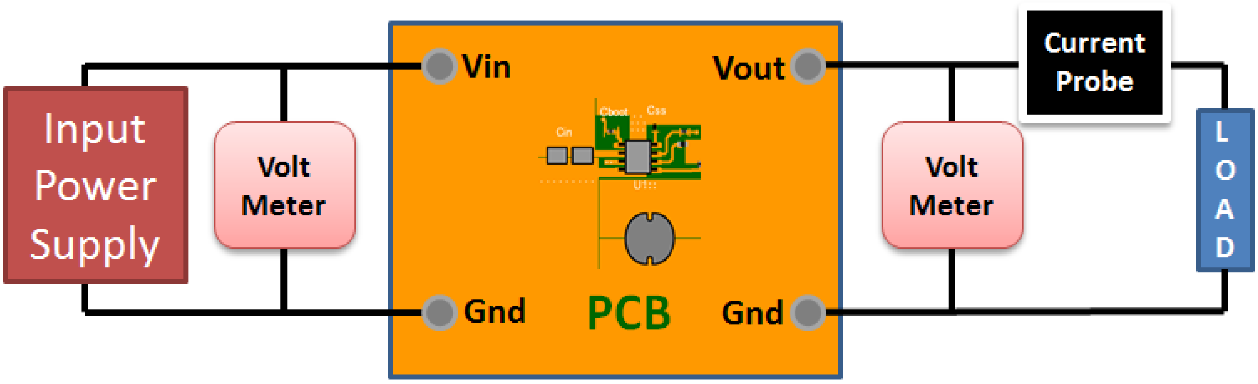
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. 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 3.0V 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.

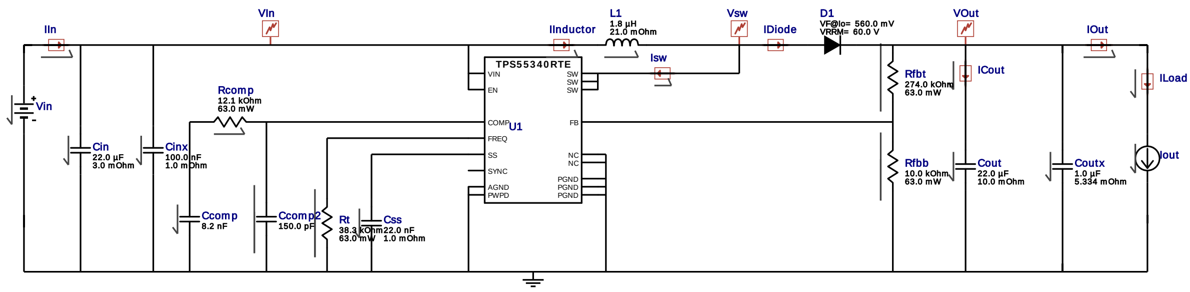


WEBENCH® Electrical Simulation Report

Design Id = 62

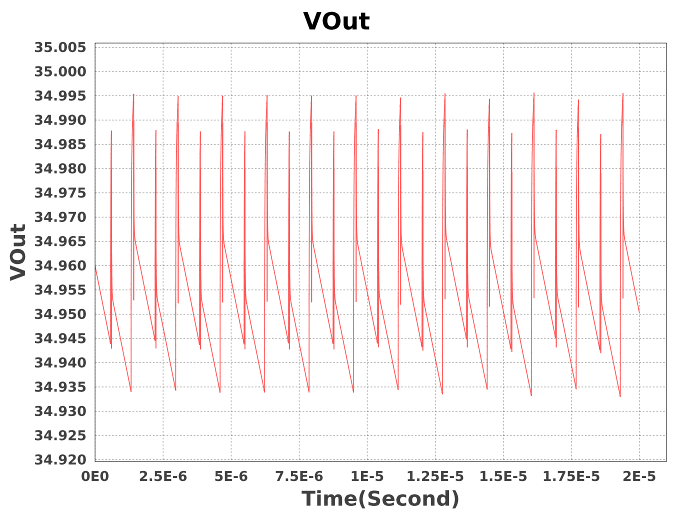
sim_id = 1

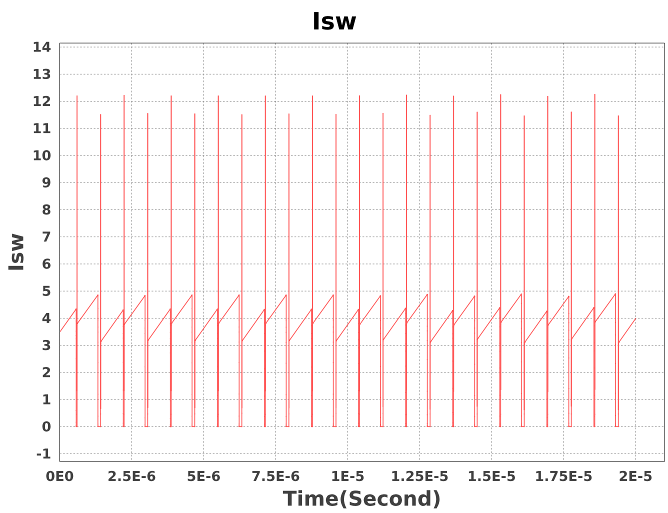
Simulation Type = Steady State



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cout	IC	no description	35.0 V
2.	Iout	I	Load Current	0.3 A





Design Assistance

1. Master key : EEFC04D00263E94359382F29FD1B7B66[v1]

2. **TPS55340** Product Folder : http://www.ti.com/product/TPS55340 : contains the data sheet and other resources.