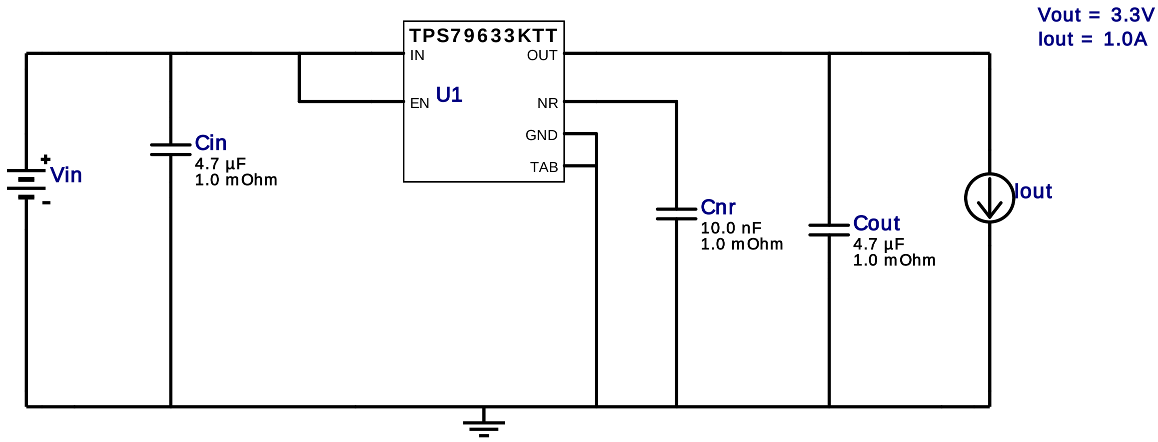
VinMin = 3.64V
VinMax = 5.08V
Vout = 3.3V
Iout = 1.0A

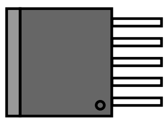
Device = TPS79633KTTR
Topology = LDO
Created = 2023-10-02 13:11:06.164
BOM Cost = $1.58
BOM Count = 4
Total Pd = 1.78W

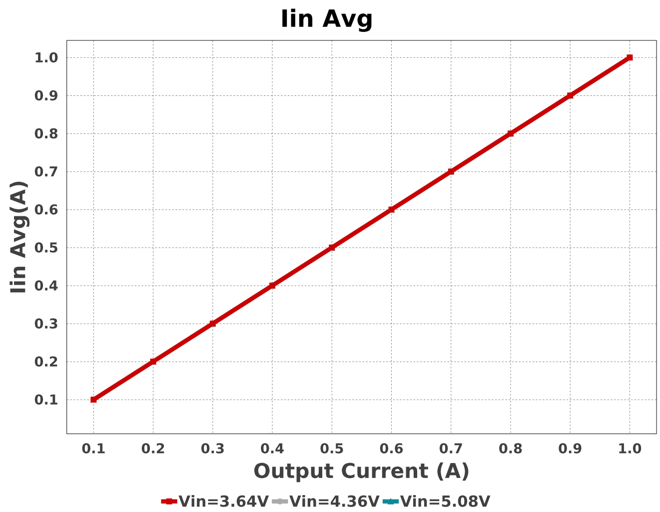
WEBENCH ® Design Report

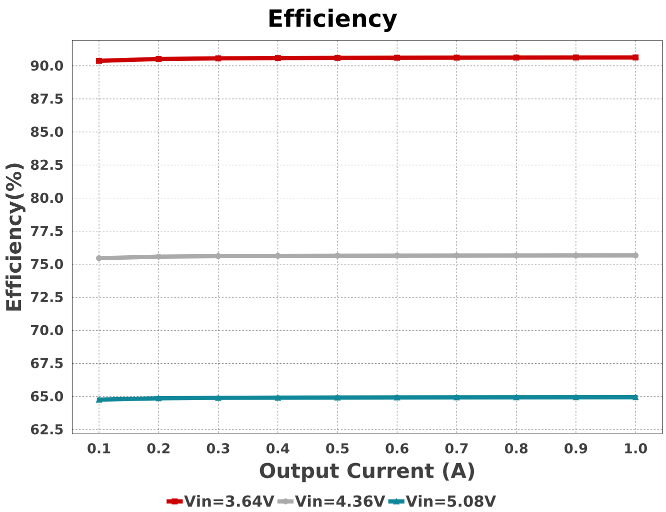
Design : 3 TPS79633KTTR
TPS79633KTTR 3.64V-5.08V to 3.30V @ 1A

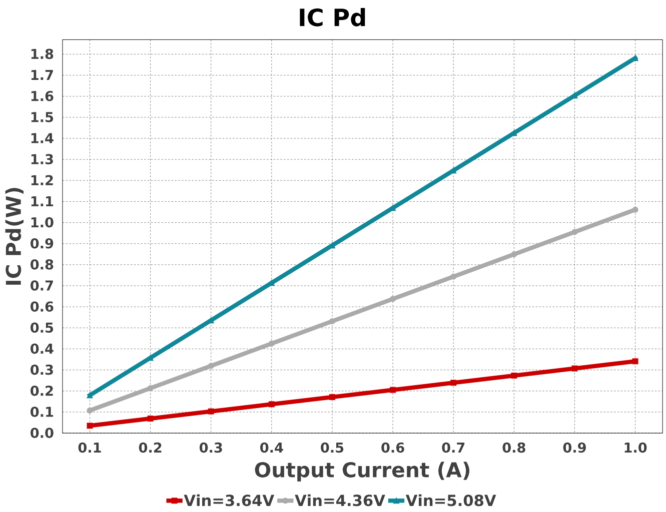


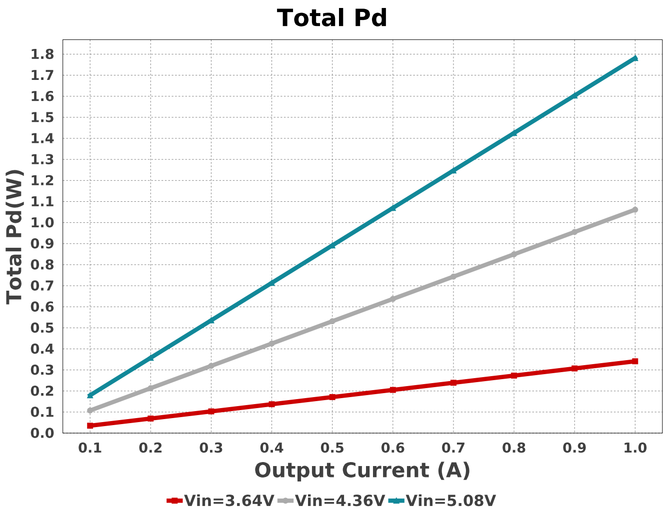
Electrical BOM

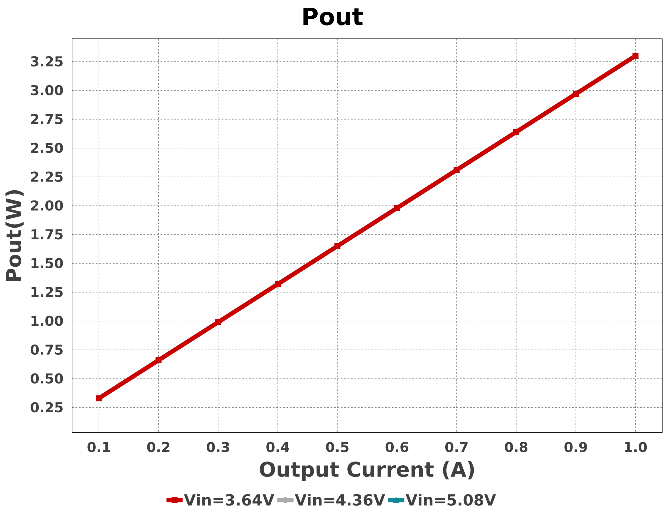
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cin	MuRata	GRM155R60J475ME87D Series= X5R	Cap= 4.7 uF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402_065 3 mm^2
Cnr	MuRata	GRM033R70J103KA01D Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2
Cout	MuRata	GRM155R60J475ME87D Series= X5R	Cap= 4.7 uF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402_065 3 mm^2
U1	Texas Instruments	TPS79633KTTR	Switcher	1	$1.55	 KTT0005A_N 210 mm^2

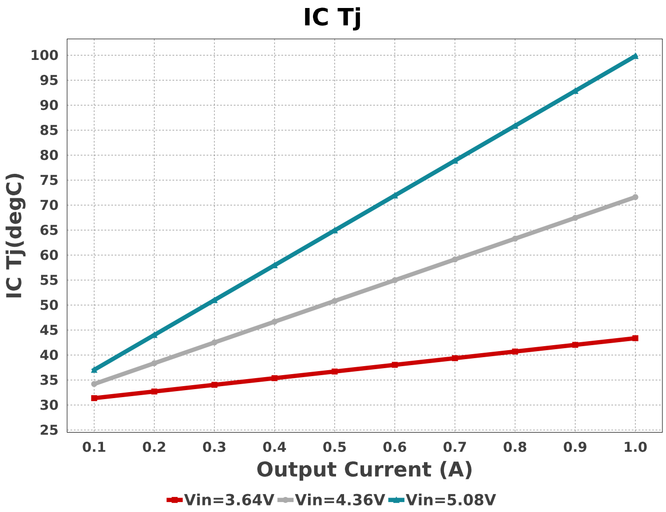

Iin Avg
Iin Avg(A)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=3.64V Vin=4.36V Vin=5.08V

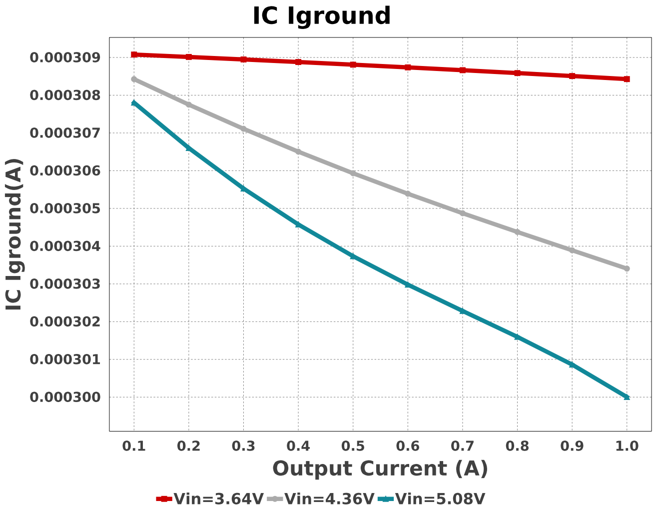

Efficiency
Efficiency(%)
90.0
87.5
85.0
82.5
80.0
77.5
75.0
72.5
70.0
67.5
65.0
62.5
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=3.64V Vin=4.36V Vin=5.08V

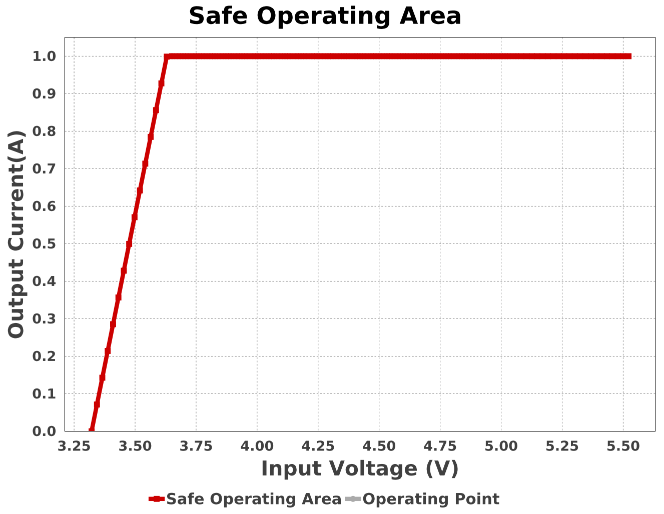

IC Pd
IC Pd(W)
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=3.64V Vin=4.36V Vin=5.08V

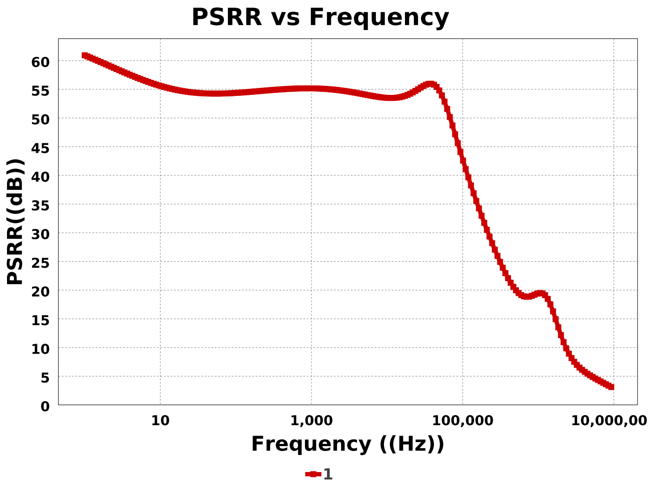

Total Pd
Total Pd(W)
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=3.64V Vin=4.36V Vin=5.08V


Pout
Pout(W)
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
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=3.64V Vin=4.36V Vin=5.08V


IC Tj
IC Tj(degC)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Output Current (A)
Vin=3.64V Vin=4.36V Vin=5.08V







Operating Values

#	Name	Value	Category	Description
1.	Output Noise RMS	45.02 µV	General	Noise RMS
2.	IC Iground	300.003 µA	IC	IC ground current
3.	IC Pd	1.782 W	IC	IC power dissipation
4.	IC Tj	99.836 degC	IC	IC junction temperature
5.	IC Tolerance	66.0 mV	IC	IC Feedback Tolerance
6.	ICThetaJA	39.2 degC/W	IC	IC junction-to-ambient thermal resistance
7.	Iin Avg	1.0 A	IC	Average input current
8.	IOUT_OP	1.0 A	Op Point	Iout operating point
9.	Input Ripple Frequency	100.0 kHz	Op Point	Input Source Ripple Frequency for PSRR Calculation
10.	PSRR est.	-42.789 dB	Op Point	Power Supply Rejection Ratio estimated
11.	VIN_OP	5.08 V	Op Point	Vin operating point
12.	Total Pd	1.782 W	Power	Total Power Dissipation
13.	BOM Count	4	System Information	Total Design BOM count
14.	Efficiency	64.941 %	System Information	Steady state efficiency
15.	FootPrint	218.0 mm^2	System Information	Total Foot Print Area of BOM components
16.	Pout	3.3 W	System Information	Total output power
17.	Total BOM	$1.58	System Information	Total BOM Cost
18.	Vin p-p	50.8 mV	System Information	Input Source ripple voltage
19.	Vout	3.3 V	System Information	Operational Output Voltage
20.	Vout Tolerance	2.0 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
21.	Vout p-p	368.486 µV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	1.0	Maximum Output Current
VinMax	5.08	Maximum input voltage
VinMin	3.64	Minimum input voltage
Vout	3.3	Output Voltage
base_pn	TPS79633	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

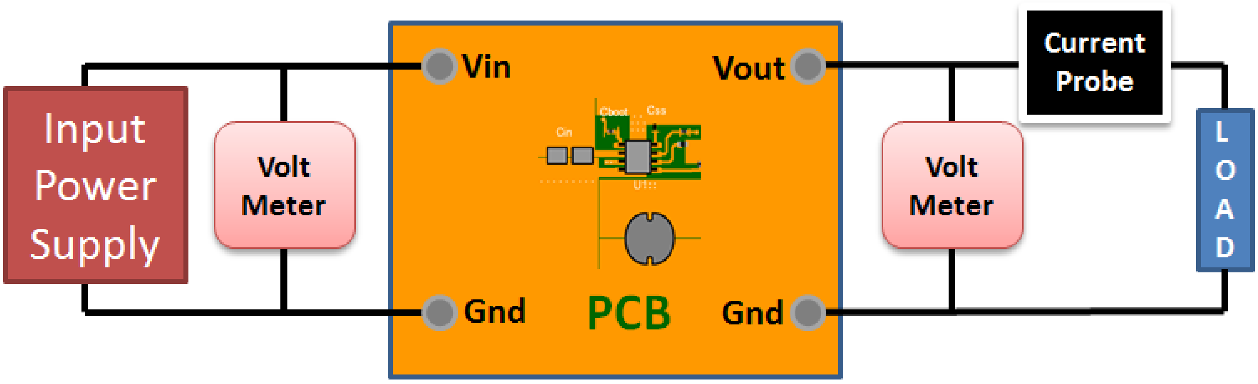
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. 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 3.64V 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.



Design Assistance

1.

2. Master key : 29F0C5E535570A6F9FC1D70942BDB839[v1]

3. **TPS79633** Product Folder : http://www.ti.com/product/TPS796 : contains the data sheet and other resources.

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