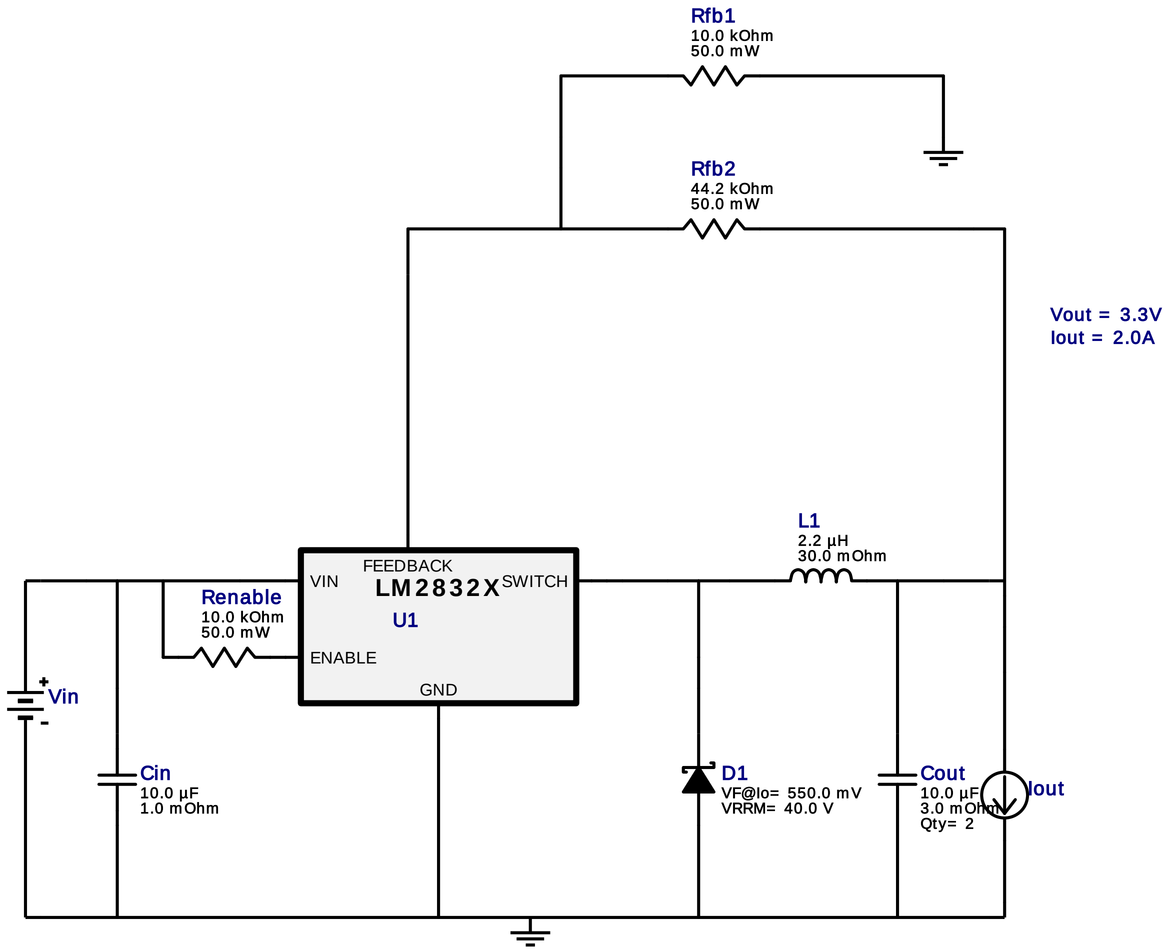
VinMin = 5.0V
VinMax = 5.0V
Vout = 3.3V
Iout = 2.0A

Device = LM2832XSD/NOPB
Topology = Buck
Created = 2022-04-26 05:39:11.021
BOM Cost = $1.00
BOM Count = 9
Total Pd = 0.97W

WEBENCH ® Design Report

Design : 8 LM2832XSD/NOPB
LM2832XSD/NOPB 5V-5V to 3.30V @ 2A

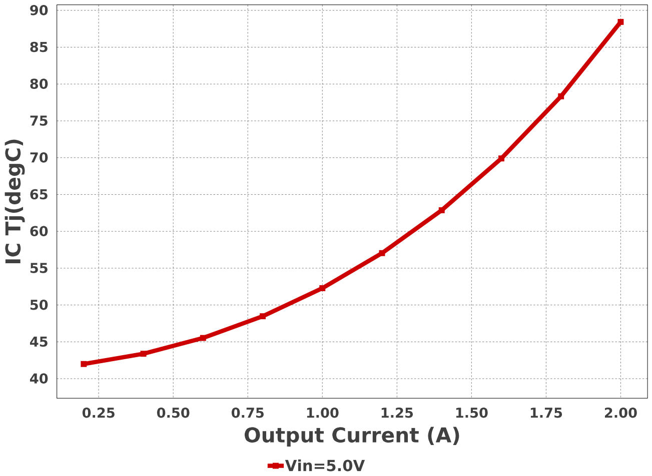


Electrical BOM

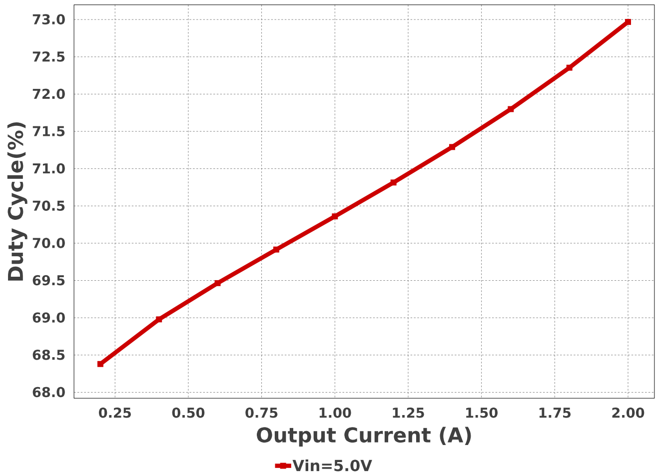
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cin	MuRata	GRM155R60J106ME15D Series= X5R	Cap= 10.0 uF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 3.52 A	1	$0.03	0402 3 mm²
Cout	Kemet	C0805C106K8PACTU Series= X5R	Cap= 10.0 uF ESR= 3.0 mOhm VDC= 10.0 V IRMS= 11.43 A	2	$0.03	0805 7 mm²
D1	Fairchild Semiconductor	SS14FL	VF@Io= 550.0 mV VRRM= 40.0 V	1	$0.04	SOD-123F 12 mm²
L1	NIC Components	NPI54C2R2MTRF	L= 2.2 µH 30.0 mOhm	1	$0.12	IND_NPI54C 61 mm²
Renable	Yageo	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Rfb1	Yageo	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Rfb2	Vishay-Dale	CRCW020144K2FNED Series= ?	Res= 44.2 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
U1	Texas Instruments	LM2832XSD/NOPB	Switcher	1	$0.73	SDE06A 16 mm²

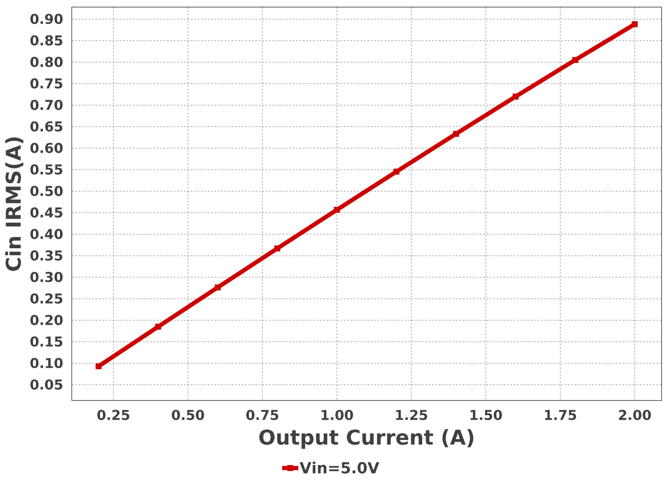
IC Tj



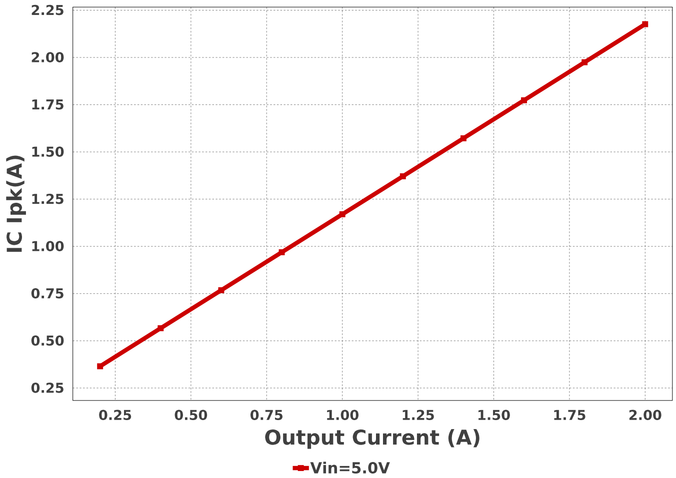
Duty Cycle



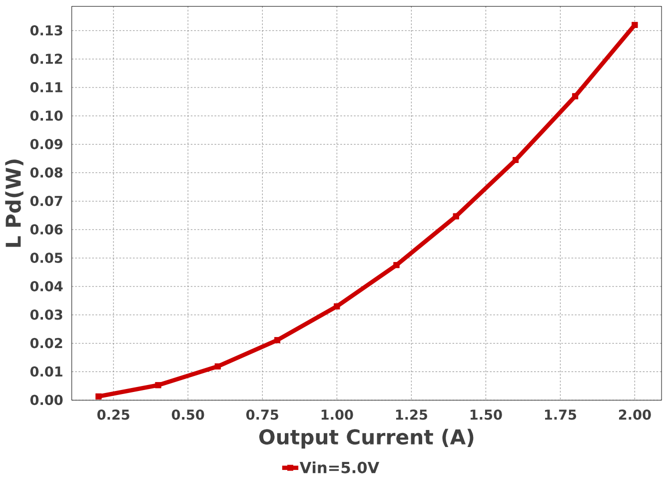
Cin IRMS



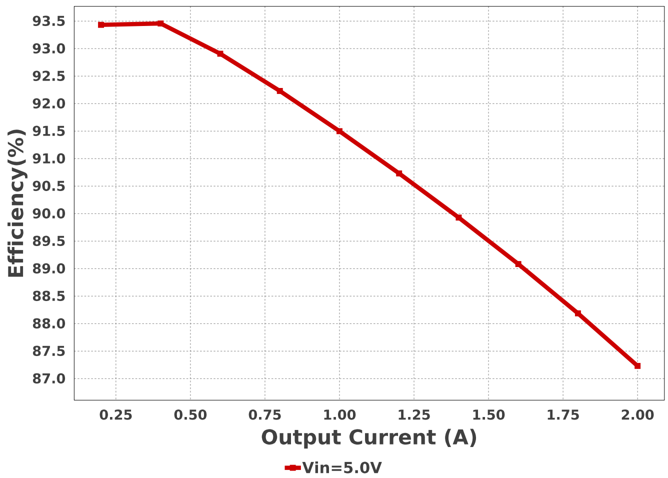
IC Ipk



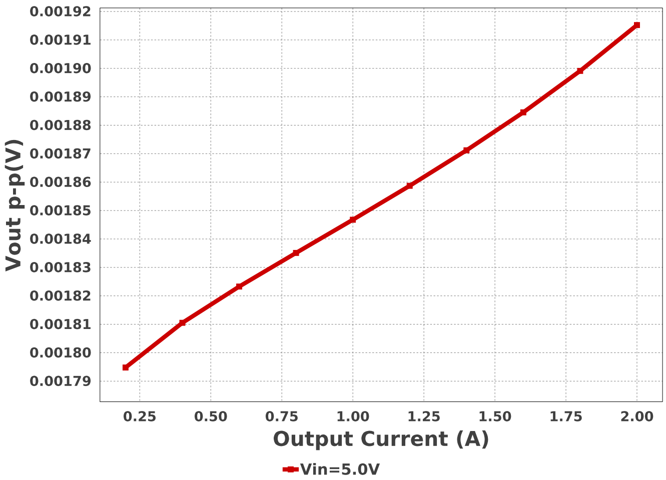
L Pd



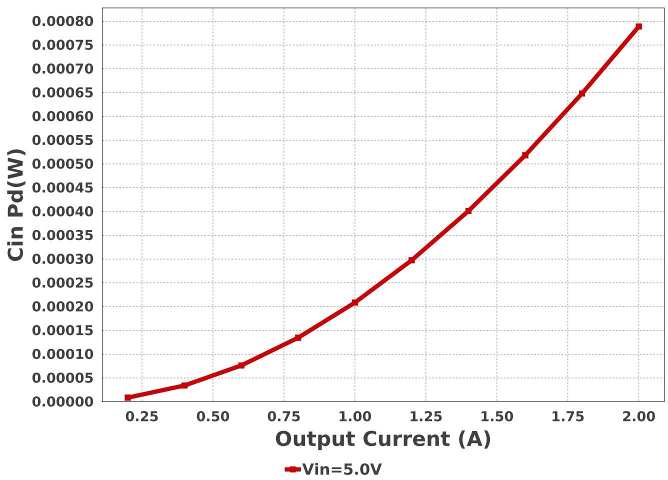
Efficiency



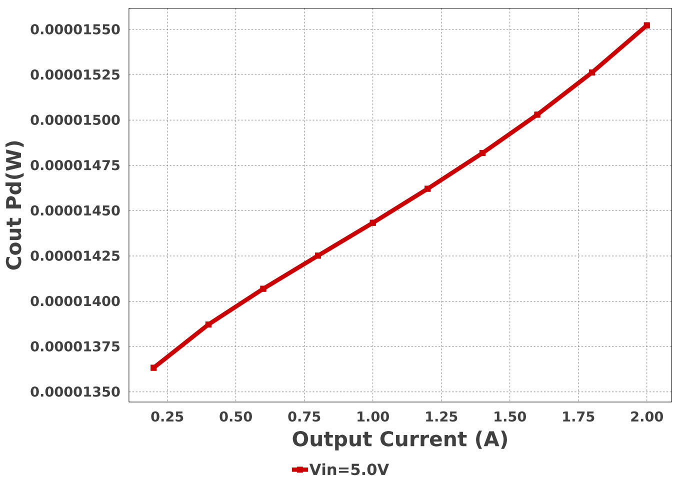
Vout p-p



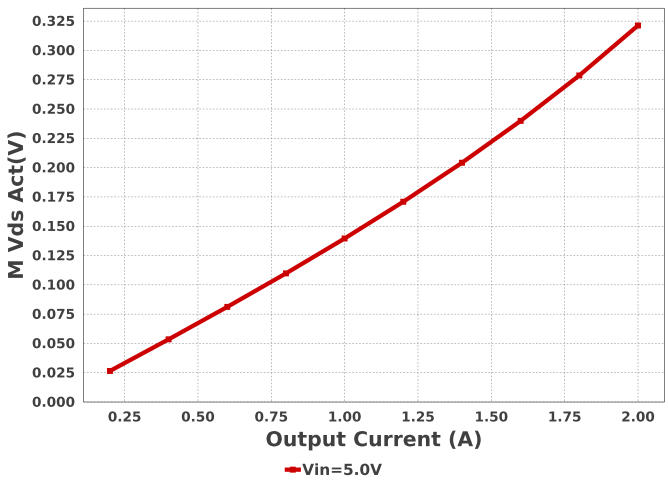
Cin Pd



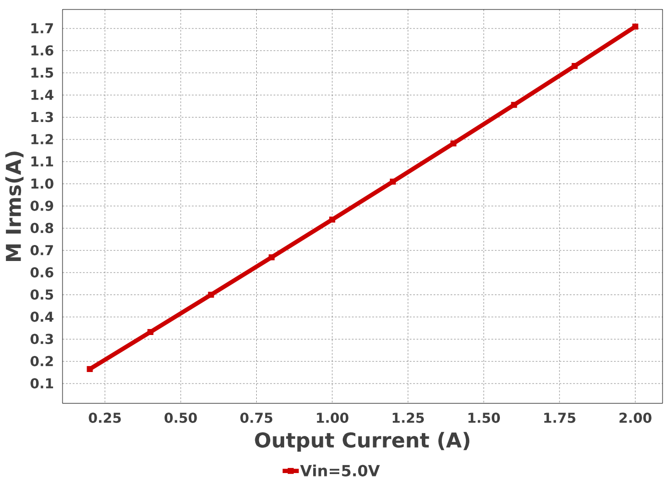
Cout Pd



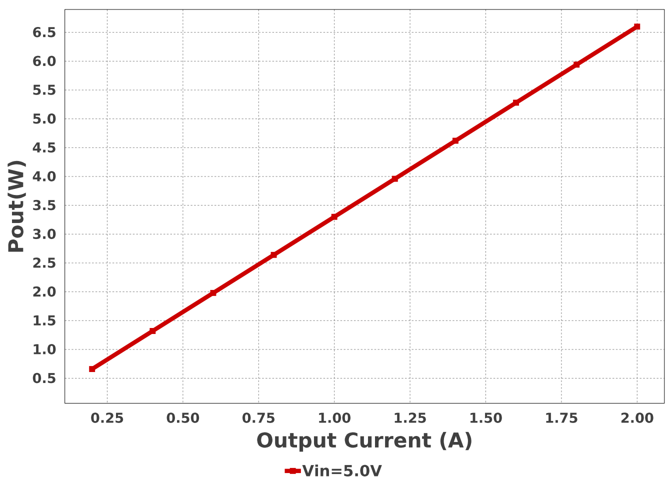
M Vds Act

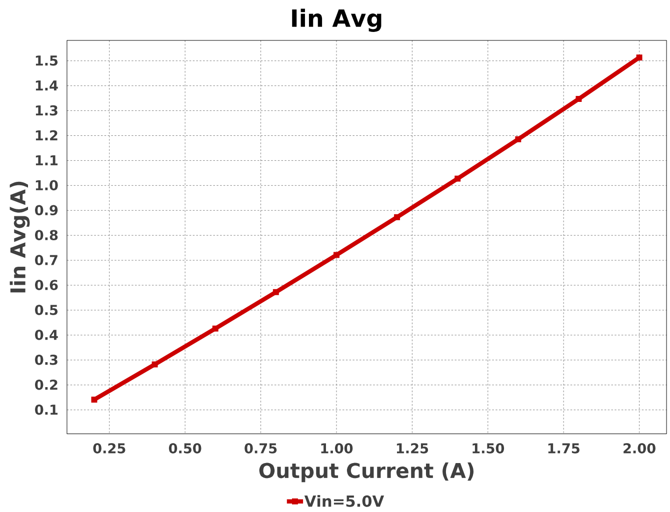


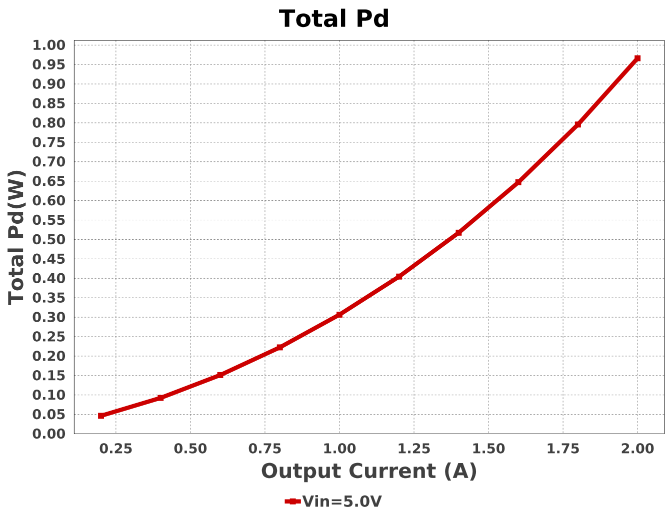
M Irms

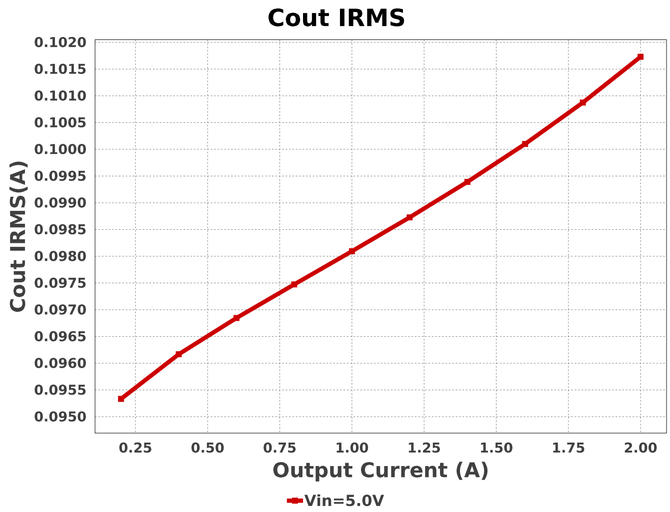


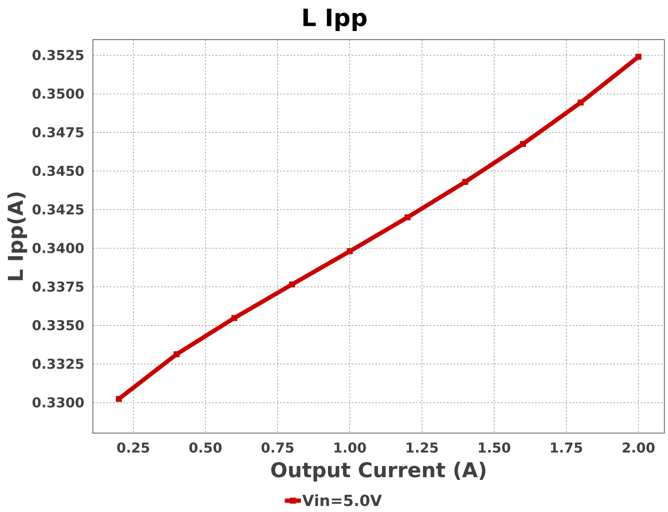
Pout

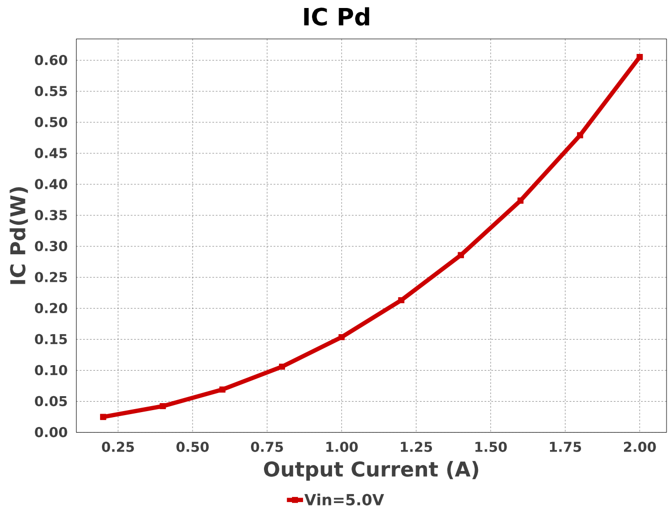


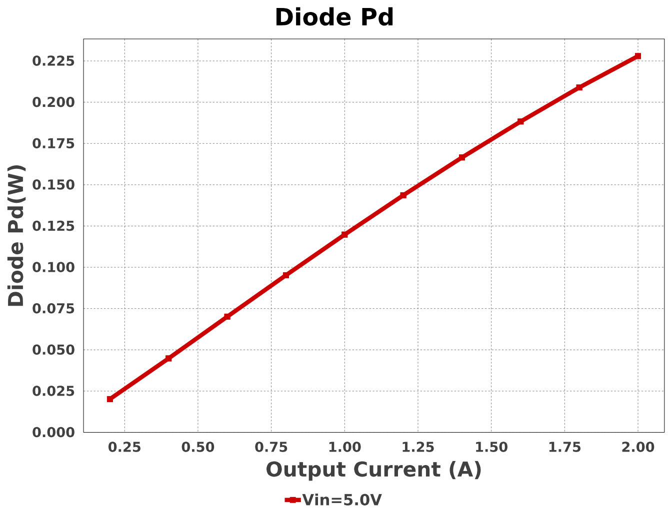












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	888.249 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	788.99 µW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	101.73 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	15.523 µW	Capacitor	Output capacitor power dissipation
5.	Diode Pd	227.94 mW	Diode	Diode power dissipation
6.	IC Ipk	2.176 A	IC	Peak switch current in IC
7.	IC Pd	605.39 mW	IC	IC power dissipation
8.	IC Tj	88.431 degC	IC	IC junction temperature
9.	IC Tolerance	12.0 mV	IC	IC Feedback Tolerance
10.	ICThetaJA	80.0 degC/W	IC	IC junction-to-ambient thermal resistance
11.	Iin Avg	1.513 A	IC	Average input current

#	Name	Value	Category	Description
12.	L Ipp	352.4 mA	Inductor	Peak-to-peak inductor ripple current
13.	L Pd	132.0 mW	Inductor	Inductor power dissipation
14.	M Irms	1.708 A	Mosfet	MOSFET RMS ripple current
15.	M Vds Act	321.284 mV	Mosfet	
16.	Cin Pd	788.99 µW	Power	Input capacitor power dissipation
17.	Cout Pd	15.523 µW	Power	Output capacitor power dissipation
18.	Diode Pd	227.94 mW	Power	Diode power dissipation
19.	IC Pd	605.39 mW	Power	IC power dissipation
20.	L Pd	132.0 mW	Power	Inductor power dissipation
21.	Total Pd	966.103 mW	Power	Total Power Dissipation
22.	BOM Count	9	System Information	Total Design BOM count
23.	Duty Cycle	72.968 %	System Information	Duty cycle
24.	Efficiency	87.231 %	System Information	Steady state efficiency
25.	FootPrint	111.0 mm^2	System Information	Total Foot Print Area of BOM components
26.	Frequency	1.6 MHz	System Information	Switching frequency
27.	Iout	2.0 A	System Information	Iout operating point
28.	Mode	CCM	System Information	Conduction Mode
29.	Pout	6.6 W	System Information	Total output power
30.	Total BOM	$1.0	System Information	Total BOM Cost
31.	Vin	5.0 V	System Information	Vin operating point
32.	Vout Actual	3.252 V	System Information	Vout Actual calculated based on selected voltage divider resistors
33.	Vout Tolerance	3.68 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
34.	Vout p-p	1.915 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	2.0	Maximum Output Current
VinMax	5.0	Maximum input voltage
VinMin	5.0	Minimum input voltage
Vout	3.3	Output Voltage
base_pn	LM2832X	Base Product Number
source	DC	Input Source Type
Ta	40.0	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

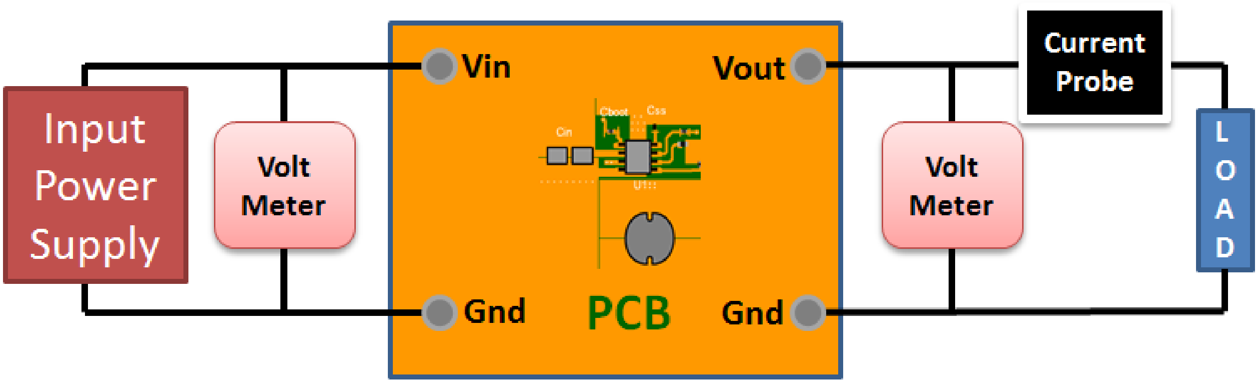
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. 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 5.0V 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.



Design Assistance

1. Master key : B64C2012C7D6430BA6FF1760121BFE27[v1]

2. **LM2832X** Product Folder : http://www.ti.com/product/LM2832 : contains the data sheet and other resources.