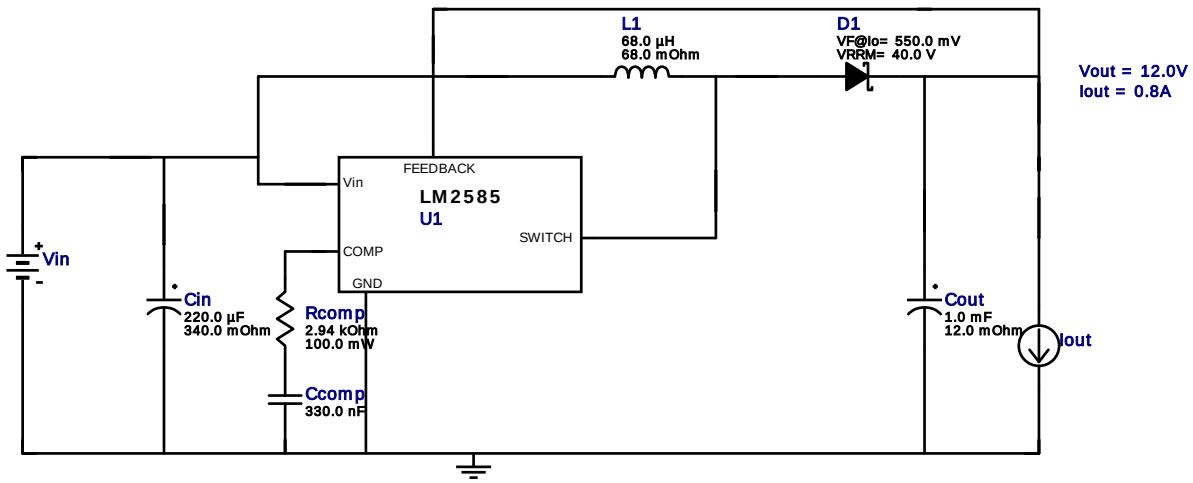
VinMin = 4.5V
VinMax = 5.5V
Vout = 12.0V
Iout = 0.8A

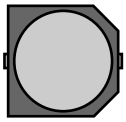
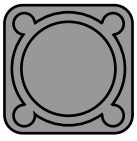
Device = LM2585S-12/NOPB
Topology = Boost
Created = 2022-09-11 11:26:06.993
BOM Cost = $6.72
BOM Count = 7
Total Pd = 2.64W

WEBENCH® Design Report

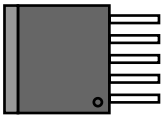
Design : 4 LM2585S-12/NOPB
LM2585S-12/NOPB New Boost Converter



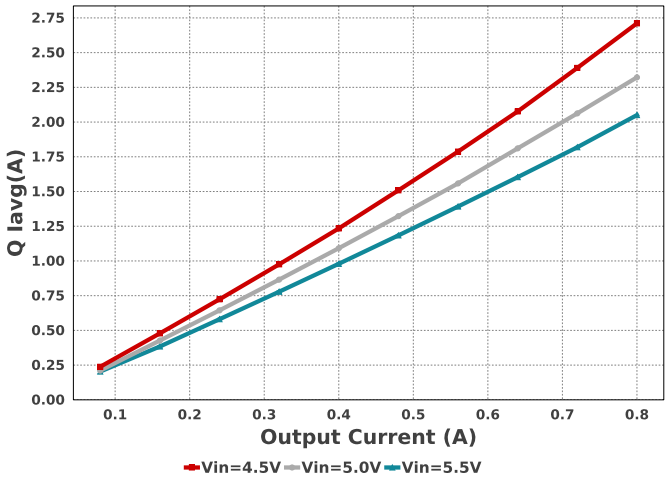
Electrical BOM

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Ccomp	Panasonic	ECPU1C334MA5 Series= ECPU(A)	Cap= 330.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.23	 1206 11 mm^2
Cin	Nichicon	UUD1C221MCL1GS Series= uD	Cap= 220.0 uF ESR= 340.0 mOhm VDC= 16.0 V IRMS= 280.0 mA	1	$0.13	 SM_RADIAL_6.3BMM 80 mm^2
Cout	Panasonic	16SVPF1000M Series= SVPF	Cap= 1.0 mF ESR= 12.0 mOhm VDC= 16.0 V IRMS= 5.4 A	1	$1.33	 CAPSMT_62_F12 151 mm^2
D1	Fairchild Semiconductor	SS24FL	VF@Io= 550.0 mV VRRM= 40.0 V	1	$0.08	 SOD-123F 12 mm^2
L1	Coilcraft	MSS1210-683MEB	L= 68.0 µH 68.0 mOhm	1	$0.81	 MSS1210 204 mm^2
Rcomp	Yageo	RC0603FR-072K94L Series= ?	Res= 2.94 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5 mm^2

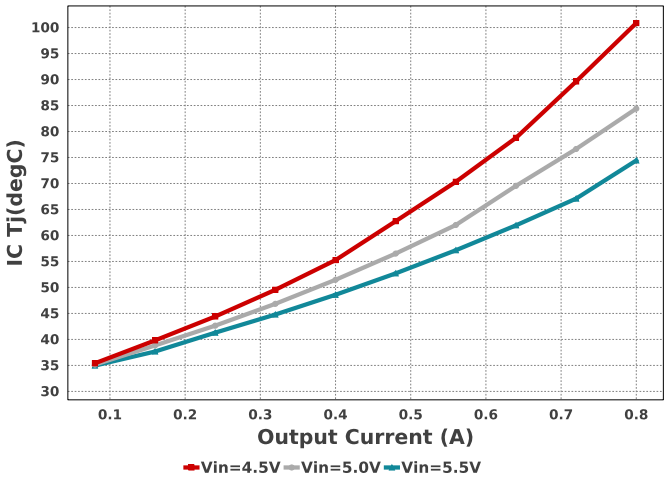
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
U1	Texas Instruments	LM2585S-12/NOPB	Switcher	1	$4.13	TS5B 199 mm²



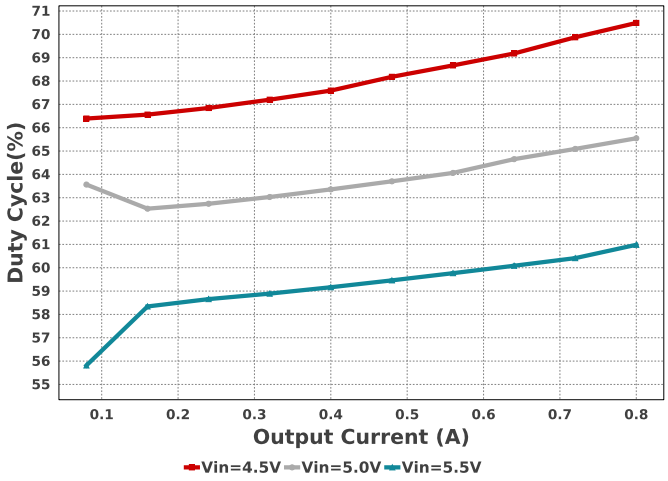
Q Iavg



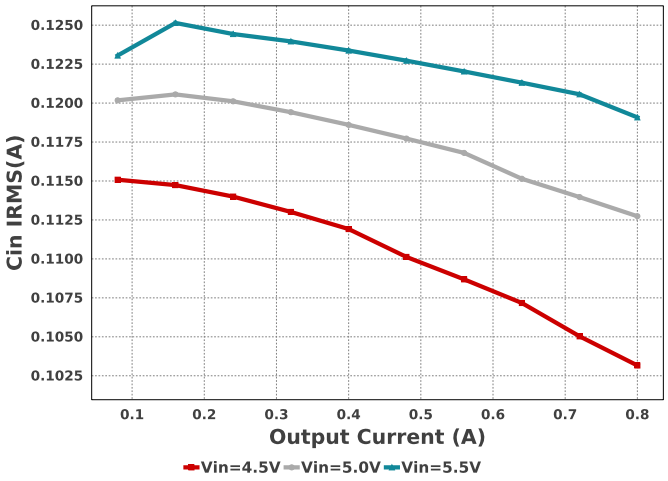
IC Tj



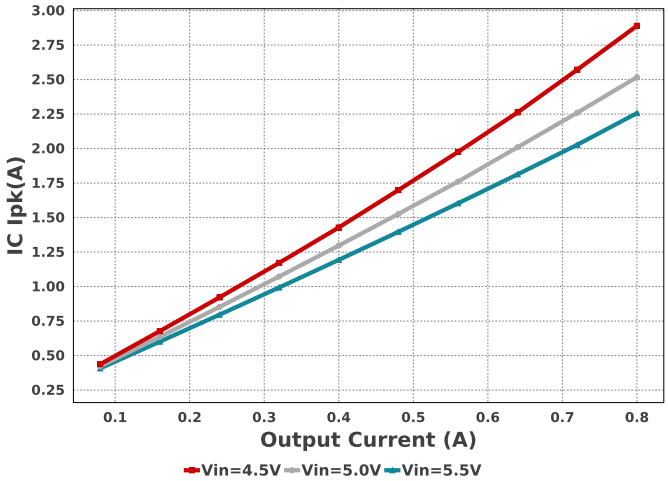
Duty Cycle



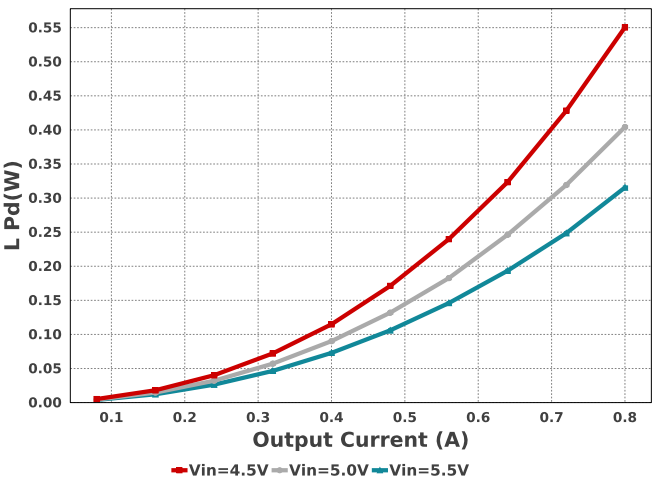
Cin IRMS

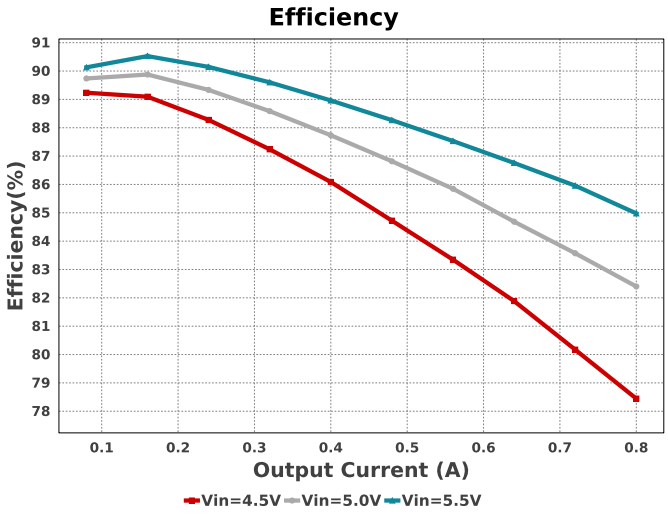


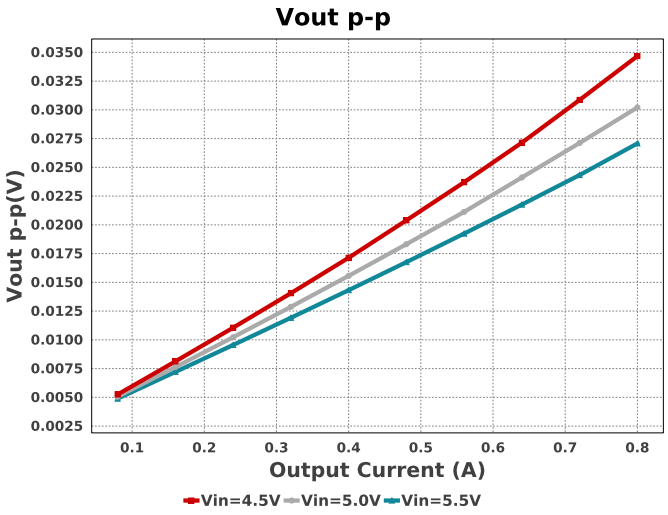
IC Ipk

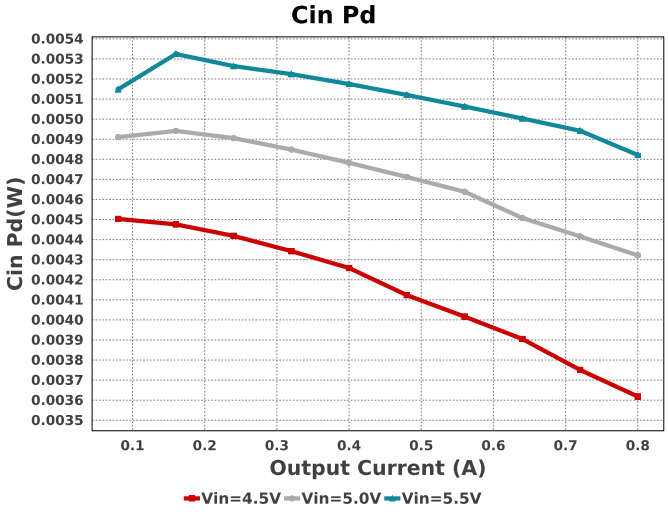


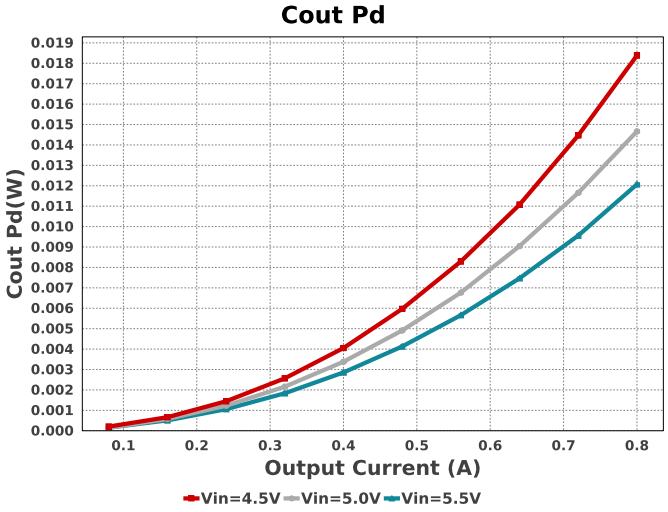
L Pd

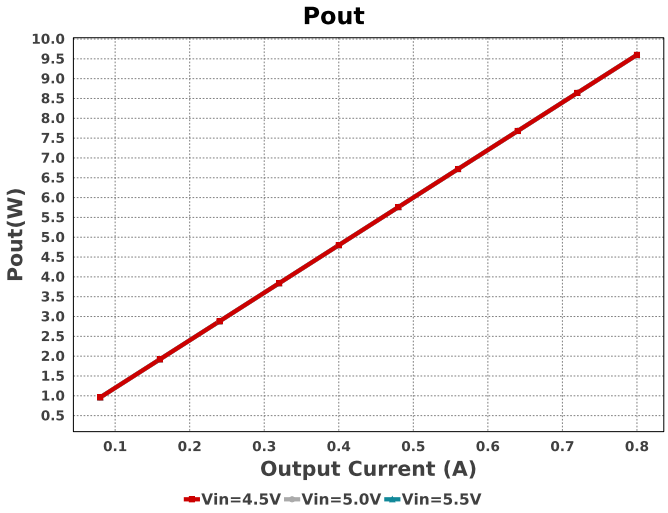


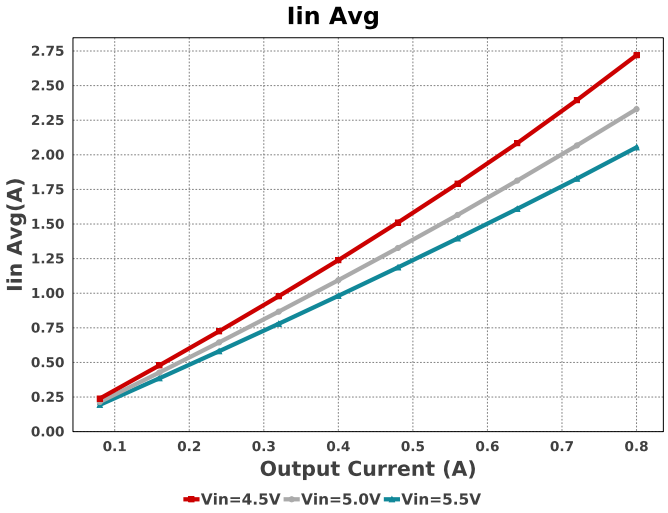


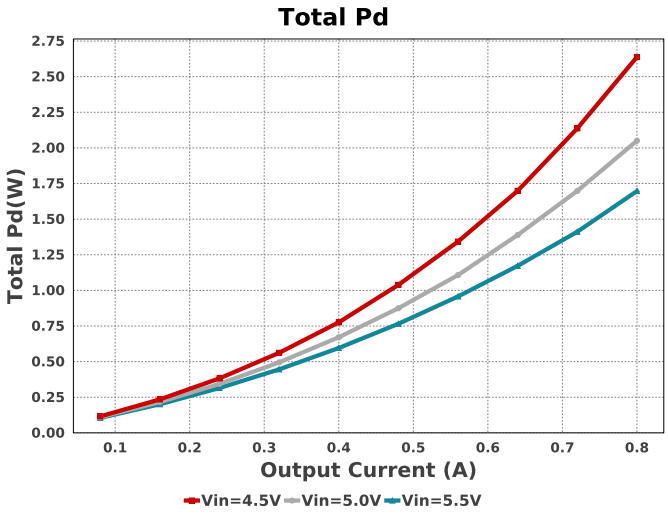


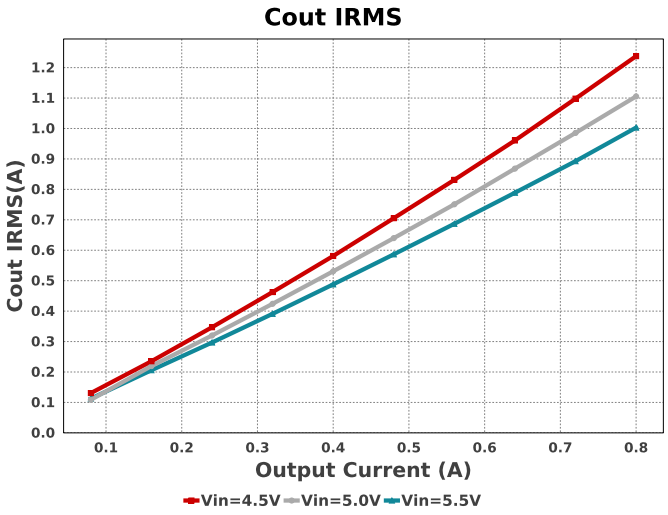


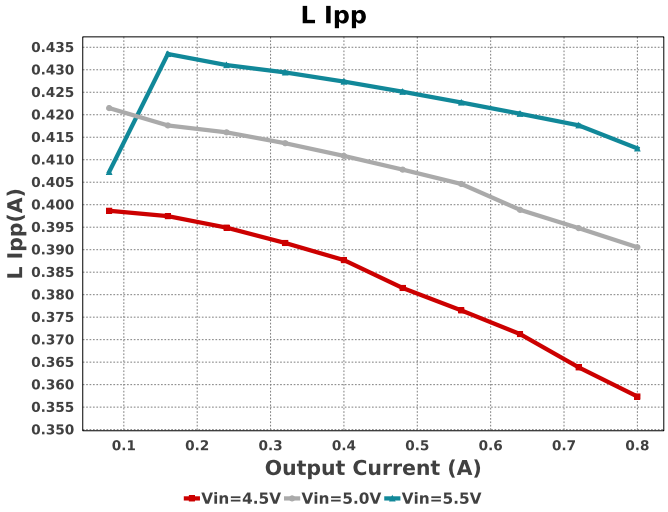


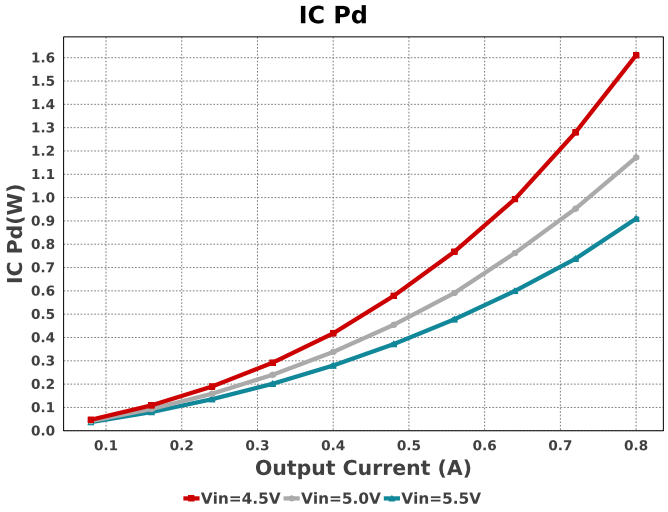


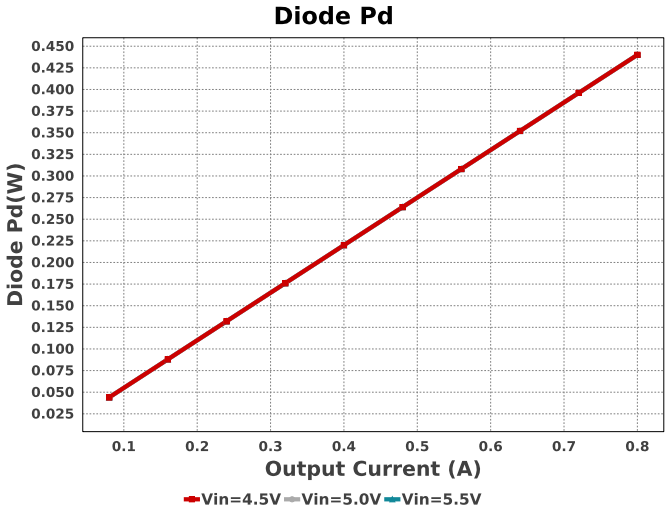


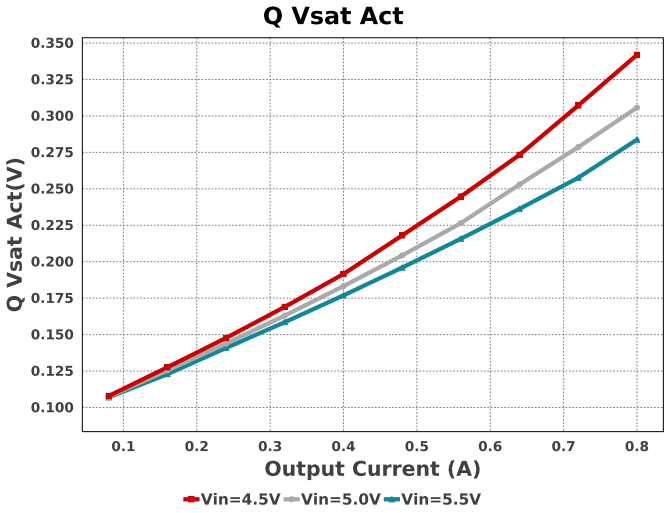


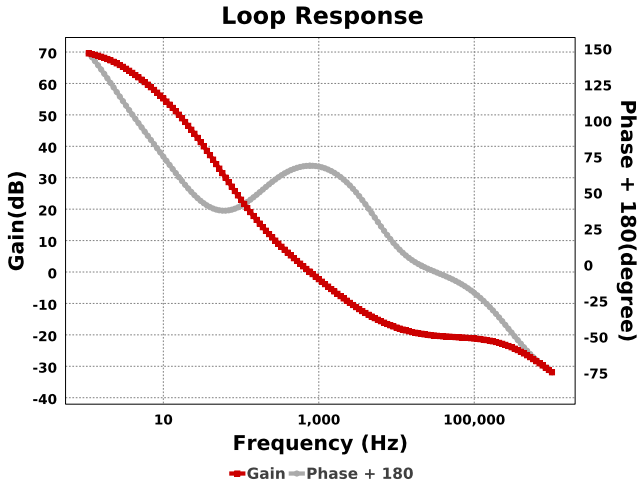












Operating Values

#	Name	Value	Category	Description
1.	BOM Count	7		Total Design BOM count
2.	Total BOM	$6.716		Total BOM Cost
3.	Cin IRMS	103.161 mA	Capacitor	Input capacitor RMS ripple current
4.	Cin Pd	3.618 mW	Capacitor	Input capacitor power dissipation
5.	Cout IRMS	1.238 A	Capacitor	Output capacitor RMS ripple current
6.	Cout Pd	18.382 mW	Capacitor	Output capacitor power dissipation
7.	Diode Pd	440.0 mW	Diode	Diode power dissipation
8.	IC Ipk	2.89 A	IC	Peak switch current in IC
9.	IC Pd	1.611 W	IC	IC power dissipation
10.	IC Tj	100.861 degC	IC	IC junction temperature
11.	IC Tolerance	0.0 V	IC	IC Feedback Tolerance
12.	ICThetaJA	40.0 degC/W	IC	IC junction-to-ambient thermal resistance
13.	Iin Avg	2.72 A	IC	Average input current
14.	L Ipp	357.361 mA	Inductor	Peak-to-peak inductor ripple current
15.	L Pd	550.47 mW	Inductor	Inductor power dissipation
16.	Q Iavg	2.711 A	Mosfet	Q Iavg
17.	Cin Pd	3.618 mW	Power	Input capacitor power dissipation
18.	Cout Pd	18.382 mW	Power	Output capacitor power dissipation
19.	Diode Pd	440.0 mW	Power	Diode power dissipation
20.	IC Pd	1.611 W	Power	IC power dissipation
21.	L Pd	550.47 mW	Power	Inductor power dissipation
22.	Total Pd	2.638 W	Power	Total Power Dissipation
23.	Cross Freq	598.33 Hz	System Information	Bode plot crossover frequency
24.	Duty Cycle	70.489 %	System Information	Duty cycle
25.	Efficiency	78.445 %	System Information	Steady state efficiency
26.	FootPrint	662.0 mm^2	System Information	Total Foot Print Area of BOM components
27.	Frequency	100.0 kHz	System Information	Switching frequency
28.	Gain Marg	-15.956 dB	System Information	Bode Plot Gain Margin
29.	Iout	800.0 mA	System Information	Iout operating point
30.	Low Freq Gain	69.088 dB	System Information	Gain at 1Hz
31.	Mode	CCM	System Information	Conduction Mode
32.	Phase Marg	64.25 deg	System Information	Bode Plot Phase Margin
33.	Pout	9.6 W	System Information	Total output power
34.	Vin	4.5 V	System Information	Vin operating point
35.	Vout p-p	34.674 mV	System Information	Peak-to-peak output ripple voltage
36.	Q Vsat Act	341.895 mV	Transistor	Q Vsat

Design Inputs

Name	Value	Description
Iout	800.0 m	Maximum Output Current
VinMax	5.5	Maximum input voltage
VinMin	4.5	Minimum input voltage
Vout	12.0	Output Voltage
base_pn	LM2585	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

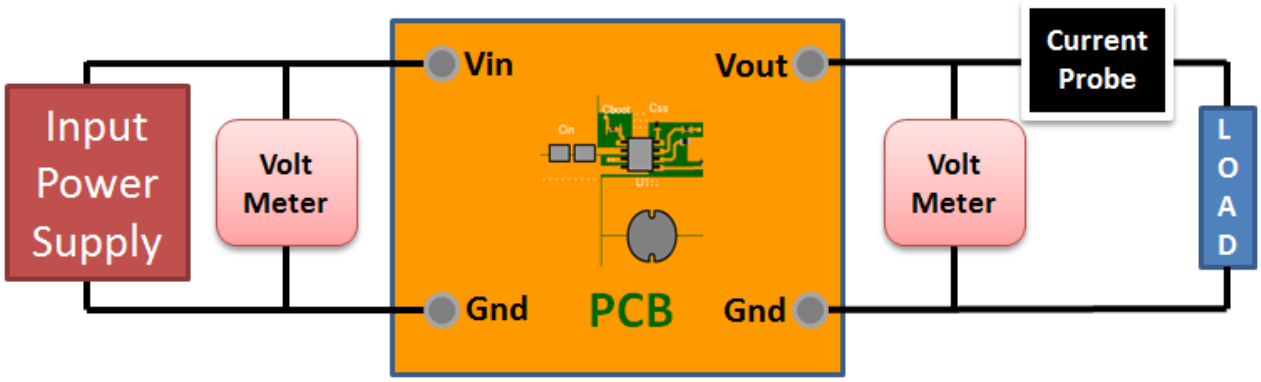
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. 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 4.5V 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 : F74A8A8BF9BD65A9C54D6D115824F2F9[v1]
2. **LM2585** Product Folder : http://www.ti.com/product/LM2585 : contains the data sheet and other resources.