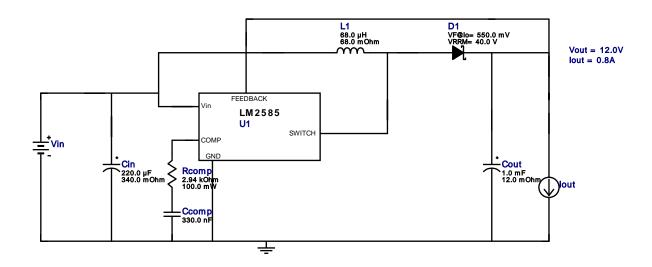
VinMin = 4.5V VinMax = 5.5V Vout = 12.0V Iout = 0.8A Device = LM2585S-12/NOPB Topology = Boost Created = 2022-09-11 11:26:06.993 BOM Cost = \$6.72 BOM Count = 7 Total Pd = 2.64W

# WEBENCH® Design Report

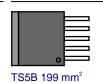
Design: 4 LM2585S-12/NOPB LM2585S-12/NOPB New Boost Converter

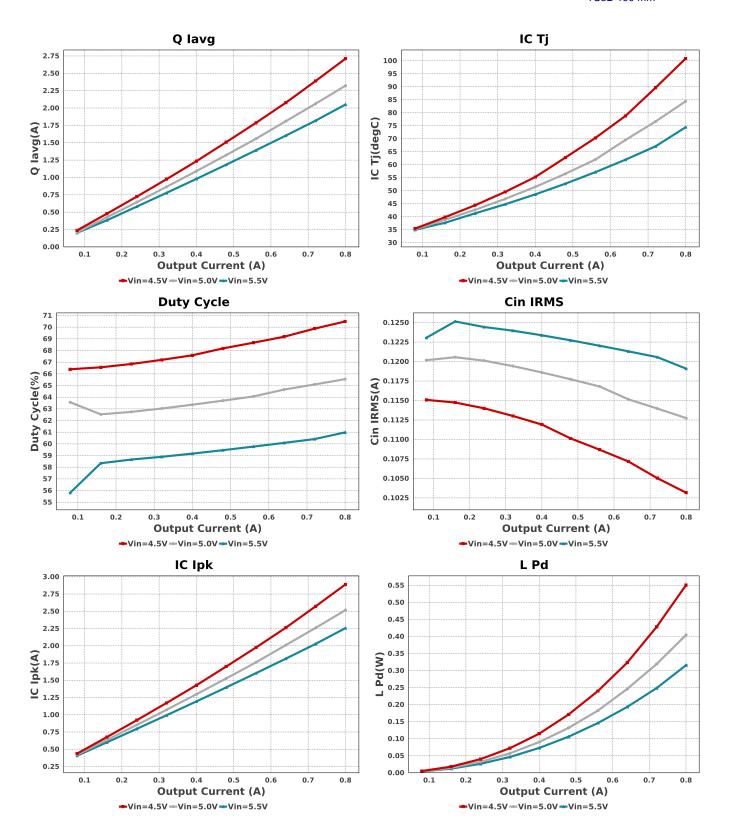


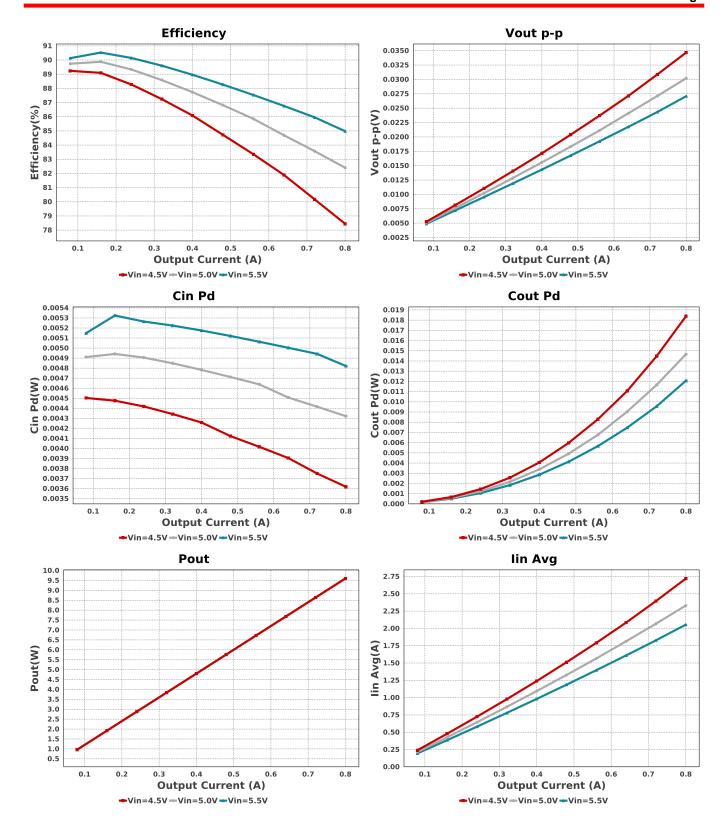
#### **Electrical BOM**

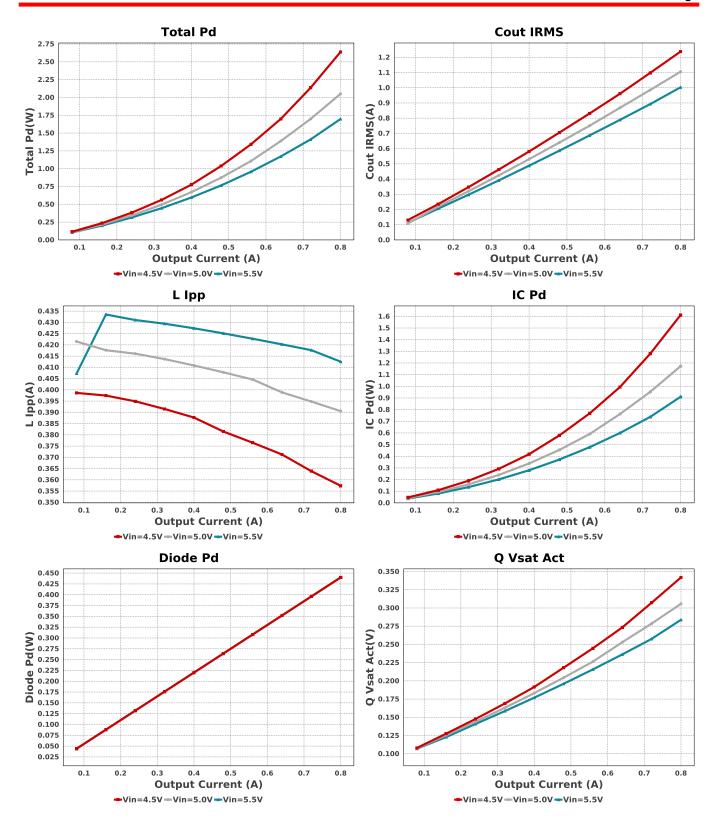
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Ccomp	Panasonic	ECPU1C334MA5 Series= ECPU(A)	Cap= 330.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.23	1206 11 mm <sup>2</sup>
Cin	Nichicon	UUD1C221MCL1GS Series= uD	Cap= 220.0 uF ESR= 340.0 mOhm VDC= 16.0 V IRMS= 280.0 mA	1	\$0.13	SM_RADIAL_6.3BMM 80 mm²
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 <sup>2</sup>
D1	Fairchild Semiconductor	SS24FL	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.08	<b>SOD-123F 12 mm²</b>
L1	Coilcraft	MSS1210-683MEB	L= 68.0 μH 68.0 mOhm	1	\$0.81	MSS1210 204 mm <sup>2</sup>
Rcomp	Yageo	RC0603FR-072K94L Series=?	Res= 2.94 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm <sup>2</sup>

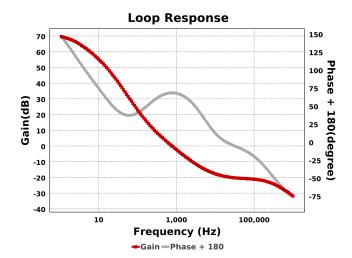
Manufacturer Part Number **Properties** Qty Price **Footprint** Name U1 LM2585S-12/NOPB **Texas Instruments** Switcher \$4.13











## **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 lpk	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.	lin Avg	2.72 A	IC	Average input current
	L lpp	357.361 mA	Inductor	Peak-to-peak inductor ripple current
	L Pd	550.47 mW	Inductor	Inductor power dissipation
	Q lavg	2.711 A	Mosfet	Q lavg
	Cin Pd	3.618 mW	Power	Input capacitor power dissipation
	Cout Pd	18.382 mW	Power	Output capacitor power dissipation
-	Diode Pd	440.0 mW	Power	Diode power dissipation
	IC Pd	1.611 W	Power	IC power dissipation
	L Pd	550.47 mW	Power	Inductor power dissipation
	Total Pd	2.638 W	Power	Total Power Dissipation
23.	Cross Freq	598.33 Hz	System	Bode plot crossover frequency
25.	Cioss i leq	390.33 TIZ	Information	Bode plot crossover frequency
24.	Duty Cycle	70.489 %	System	Duty cycle
	Duty Cycle	70.400 70	Information	Buty by old
25.	Efficiency	78.445 %	System	Steady state efficiency
25.	Liliciency	70.445 /6	Information	Steady State emoleticy
26.	FootPrint	CCO O2		Total Foot Print Area of BOM components
20.	FOOLFIIII	662.0 mm <sup>2</sup>	System	Total Foot Fillit Area of Bowl components
27	Eroguanav	100 0 kH <del>-</del>	Information	Switching froquency
27.	Frequency	100.0 kHz	System	Switching frequency
00	Cain Mann	4E 0E0 4D	Information	Dada Blat Cain Maurin
28.	Gain Marg	-15.956 dB	System	Bode Plot Gain Margin
		000 0 4	Information	
29.	lout	800.0 mA	System	lout operating point
			Information	
30.	Low Freq Gain	69.088 dB	System	Gain at 1Hz
			Information	
31.	Mode	CCM	System	Conduction Mode
			Information	
32.	Phase Marg	64.25 deg	System	Bode Plot Phase Margin
			Information	
33.	Pout	9.6 W	System	Total output power
			Information	
34.	Vin	4.5 V	System	Vin operating point
			Information	
35.	Vout p-p	34.674 mV	System	Peak-to-peak output ripple voltage
			Information	, , , , , , , , , , , , , , , , , , , ,

### **Design Inputs**

Name	Value	Description	
lout	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	
Та	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 lout 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.

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