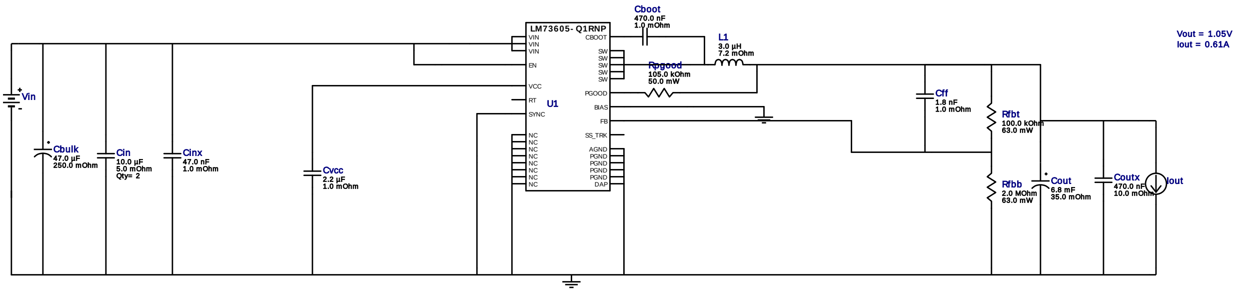
VinMin = 4.5V
VinMax = 5.5V
Vout = 1.05V
Iout = 0.61A

Device = LM73605QRNPRQ1
Topology = Buck
Created = 2019-12-05 05:21:06.694
BOM Cost = $4.69
BOM Count = 14
Total Pd =

WEBENCH ® Design Report

Design : 7631 LM73605QRNPRQ1
LM73605QRNPRQ1 4.5V-5.5V to 1.05V @ 0.61A



1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.

2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating at a much lower voltage than the maximum input voltage. Sizing the inductor based on the maximum input voltage may yield an inductance much larger than typically needed, causing a larger footprint for the overall design. At the same time, components such as the input capacitor must be rated based on the maximum input voltage. WEBENCH now supports the use of this additional input voltage specification.

3. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application.View WEBENCH(R) Disclaimer.

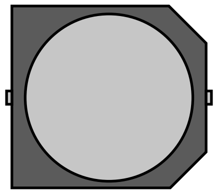
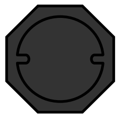
Design Alerts

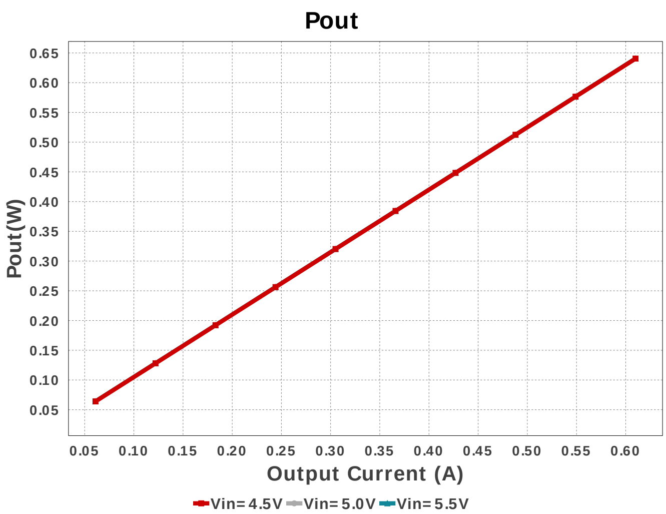
Component Selection Information

As light load performance of the device is not modeled, Efficiency and power disspiation charts are disabled and operating values are not displayed for PFM mode of operation. The LM73605-Q1 is qualified for Automotive applications.All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application.

Electrical BOM

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cboot	MuRata	GRM155R60J474KE19D Series= X5R	Cap= 470.0 nF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.02	0402 3 mm²
Cbulk	AVX	TPSB476K010R0250 Series= TPS	Cap= 47.0 uF ESR= 250.0 mOhm VDC= 10.0 V IRMS= 525.0 mA	1	$0.18	3528-21 17 mm²
Cff	MuRata	GRM216R71E182KA01D Series= X7R	Cap= 1.8 nF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
Cin	Samsung Electro-Mechanics	CL32B106KBJNNWE Series= X7R	Cap= 10.0 uF ESR= 5.0 mOhm VDC= 50.0 V IRMS= 0.0 A	2	$0.17	1210_270 15 mm²
Cinx	MuRata	GRM155R71E473KA88D Series= X7R	Cap= 47.0 nF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cout	Panasonic	EEV-FK0J682M Series= FK	Cap= 6.8 mF ESR= 35.0 mOhm VDC= 6.3 V IRMS= 1.8 A	1	$0.70	 SM_RADIAL_J16 399 mm^2
Coutx	MuRata	GRM188R70J474KA01D Series= X7R	Cap= 470.0 nF ESR= 10.0 mOhm VDC= 6.3 V IRMS= 2.91 A	1	$0.03	0603 5 mm^2
Cvcc	Taiyo Yuden	EMK212BJ225KG-T Series= X5R	Cap= 2.2 uF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm^2
L1	Bourns	SRU1048-3R0Y	L= 3.0 µH 7.2 mOhm	1	$0.40	 SRU1048 144 mm^2
Rfbb	Vishay-Dale	CRCW04022M00FKED Series= CRCW..e3	Res= 2.0 MOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
Rfbt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
Rpgood	Yageo	RC0201FR-07105KL Series= ?	Res= 105.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm^2
U1	Texas Instruments	LM73605QRNPRQ1	Switcher	1	$2.95	 RNP0030A 48 mm^2



Operating Values

#	Name	Value	Category	Description
1.	ICThetaJA	15.25 degC/W	IC	IC junction-to-ambient thermal resistance
2.	BOM Count	14	System Information	Total Design BOM count
3.	FootPrint	670.0 mm^2	System Information	Total Foot Print Area of BOM components
4.	Iout	610.0 mA	System Information	Iout operating point

#	Name	Value	Category	Description
5.	Mode	PFM	System Information	Conduction Mode
6.	Pout	640.5 mW	System Information	Total output power
7.	Total BOM	$4.69	System Information	Total BOM Cost
8.	Vin	5.5 V	System Information	Vin operating point
9.	Vout	1.05 V	System Information	Operational Output Voltage
10.	Vout Actual	1.05 V	System Information	Vout Actual calculated based on selected voltage divider resistors
11.	Vout Tolerance	1.998 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

Name	Value	Description
Iout	610.0 m	Maximum Output Current
VinMax	5.5	Maximum input voltage
VinMin	4.5	Minimum input voltage
Vout	1.05	Output Voltage
base_pn	LM73605-Q1	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

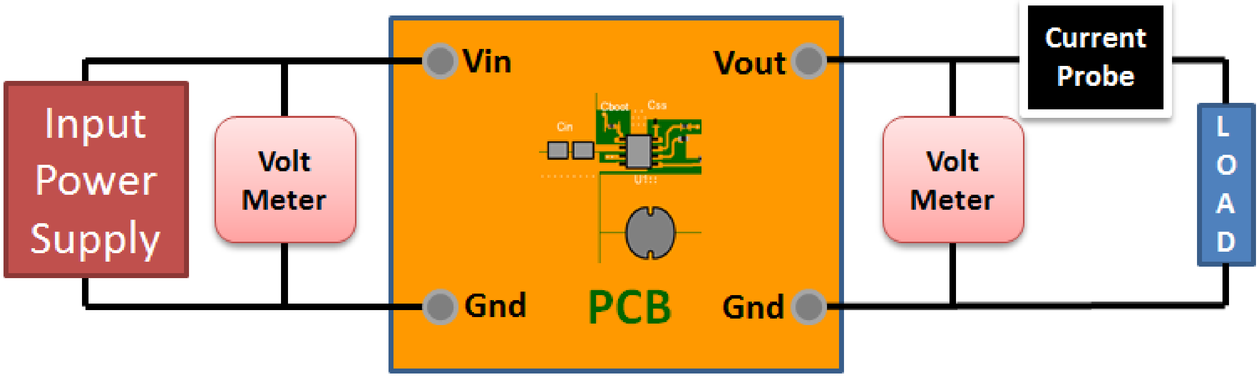
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. 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. The LM73605-Q1 is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application.

2. Master key : B9C964572EBB957B[v1]

3. **LM73605-Q1** Product Folder : http://www.ti.com/product/LM73605 : contains the data sheet and other resources.

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