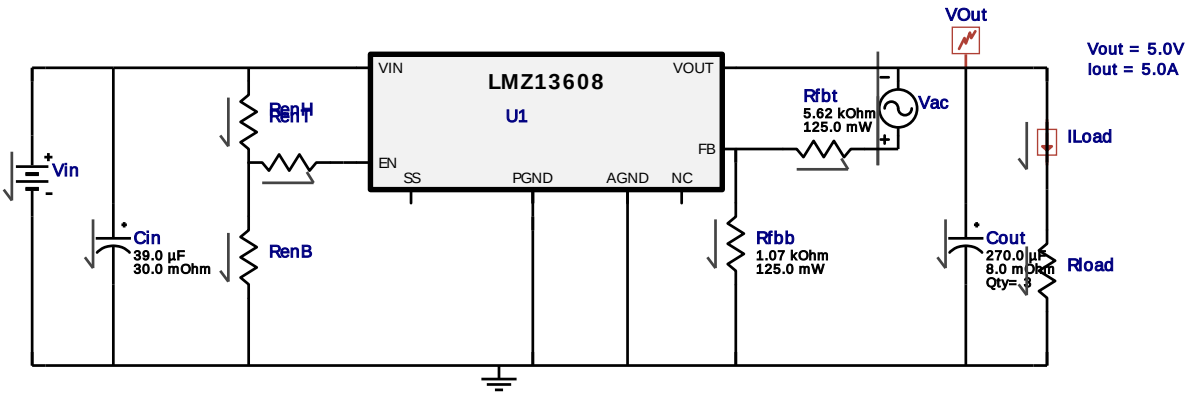
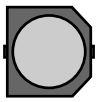
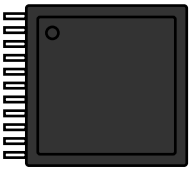
WEBENCH ® Electrical Simulation Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 5.0V
Iout = 5.0A

Device = LMZ13608TZ/NOPB
Topology = Buck
Created = 4/13/16 8:01:40 PM
User ID = 3691018
Design Id = 23
eSim Id = 1
Simulation Type = Bode Plot

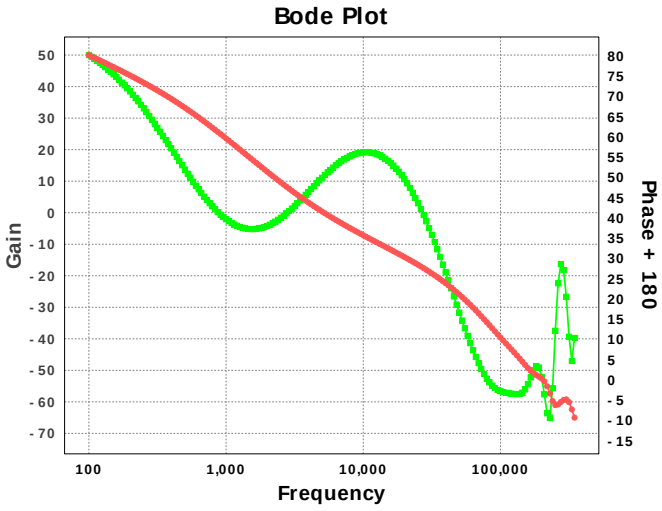


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	Panasonic	35SVPF39M Series= SVPF	Cap= 39.0 µF ESR= 30.0 mOhm VDC= 35.0 V IRMS= 2.8 A	1	$0.50	 CAPSMT_62_E7 106 mm²
2.	Cout	Panasonic	16SVPG270M Series= SVPG	Cap= 270.0 µF ESR= 8.0 mOhm VDC= 16.0 V IRMS= 5.8 A	3	$0.70	 CAPSMT_62_C10 74 mm²
3.	Rfbb	Panasonic	ERJ-6ENF1071V Series= ERJ-6E	Res= 1.07 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
4.	Rfbt	Panasonic	ERJ-6ENF5621V Series= ERJ-6E	Res= 5.62 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
5.	U1	Texas Instruments	LMZ13608TZ/NOPB	Switcher	1	$12.80	 TZA011A 342 mm²

Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cinj	C	Injection Isolation Capacitance	10 F
2.	Linj	L	Injection Isolation Inductance	10 H
3.	Vinj	AC	AC Voltage Source Amplitude	1 V
4.	Rload	R	Load Resistance	1.0 Ohm



Design Inputs

#	Name	Value	Description
1.	Iout	5.0 A	Maximum Output Current
2.	VinMax	22.0 V	Maximum input voltage
3.	VinMin	14.0 V	Minimum input voltage
4.	Vout	5.0 V	Output Voltage
5.	base_pn	LMZ13608	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0 degC	Ambient temperature

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.118 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.493 A	Current	Output capacitor RMS ripple current
3.	IC Ipk	7.586 A	Current	Peak switch current in IC
4.	Iin Avg	1.288 A	Current	Average input current
5.	M Irms	2.42 A	Current	MOSFET RMS current
6.	BOM Count	7	General	Total Design BOM count
7.	FootPrint	683.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	350.0 kHz	General	Switching frequency
9.	IC Tolerance	20.0 mV	General	IC Feedback Tolerance
10.	M Vds Act	38.087 mV	General	Voltage drop across the MosFET
11.	Mode	CCM	General	Conduction Mode
12.	Pout	25.0 W	General	Total output power
13.	Total BOM	$15.42	General	Total BOM Cost
14.	Vout Actual	5.002 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	5.742 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	23.423 %	Op_point	Duty cycle
18.	Efficiency	88.226 %	Op_point	Steady state efficiency
19.	IC Tj	61.96 degC	Op_point	IC junction temperature
20.	ICThetaJA	10.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	5.0 A	Op_point	Iout operating point
22.	Phase Marg	44.501 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	22.0 V	Op_point	Vin operating point
24.	Vout p-p	2.28 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	134.526 mW	Power	Input capacitor power dissipation
26.	Cout Pd	5.943 mW	Power	Output capacitor power dissipation
27.	IC Drive Pd	0.0 W	Power	Driver power dissipation
28.	IC Iq Pd	22.0 mW	Power	IC Iq Pd
29.	IC Pd	3.196 W	Power	IC power dissipation
30.	Total Pd	3.336 W	Power	Total Power Dissipation
31.	Vout Tolerance	3.343 %	Unknown	Vout Tolerance based on IC Tolerance and voltage divider resistors if applicable

Design Assistance

1. The Modules are very easy to use and just need a basic design using a resistor divider at the feedback and input and output caps to work. To design for UVLO you could click on the drop down menu in the 'Change Inputs' menu and select the 'UVLO Enabled Design'. The internal softstart time is set at 1.6mSec. If a longer softstart time is desired, you could change the preset to the desired amount and click on 'Submit'. Webench will then add an external softstartcap to the schematic. For designs requiring more than 8A of load current, multiple LMZ23608 parts

can be used by connecting their 'SH' pins together. The 'Master' LMZ23608is set by connecting the resistor divider from feedback to the output. The slaves have their feedback pins open.

2. LMZ13608 Product Folder : http://www.ti.com/product/LMZ13608 : contains the data sheet and other resources.